

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES & ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER

RECEIVED

DEC 29 2008

DIVISION OF WATER

APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM
AND / OR WATER QUALITY CERTIFICATION

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. If the project involves work in a stream, such as bank stabilization, dredging or relocation, you will also need to obtain a 401 Water Quality Certification (WQC) from the Division of Water. This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact John Dovak at 502/564-3410.

If the project will disturb more than 1 acre of soil, you will also need to complete the attached Notice of Intent for Storm Water Discharges, and return both forms to the Floodplain management Section of the KDOW. This general permit will require you to create and implement an erosion control plan for the project.

1. OWNER: Kentucky Department of Fish & Wildlife Resources 19105
Give name of person(s), company, governmental unit, or other owner of proposed project.
- MAILING ADDRESS: 1 Sportsman's Lane
Frankfort, Kentucky 40601
- TELEPHONE #: (502) 564-3400 EMAIL: _____
2. AGENT: KDF&WR c/o Benjy Kinman
Give name of person(s) submitting application, if other than owner.
- ADDRESS: 1 Sportsman's Lane
Frankfort, Kentucky 40601
- TELEPHONE #: (502) 564-3400 EMAIL: Benjy.kinman@ky.gov
3. ENGINEER: _____ P. E. NUMBER _____
Contact Division of Water if waiver can be granted
- TELEPHONE #: _____ EMAIL: _____
4. DESCRIPTION OF CONSTRUCTION: This is a stream mitigation project being performed under the Kentucky Department of Fish & Wildlife Resources' agreement with the Corps of Engineers for utilizing in-lieu fee funding obtained from previous impacts. This project specifically concerns the restoration/enhancement of 3159 feet of the East Fork Little Sandy River. It will involve some realignment, streambank stabilization, development of bankfull benches, and in-stream structures. A riparian zone will also be established along the entire length of the project. There are multiple property owners. A conservation easement will protect the area from future impacts to the finished project.
5. COUNTY: Lawrence NEAREST COMMUNITY: Louisa
6. USGS QUAD NAME: Fallsburg LATITUDE/LONGITUDE: N38-13-14,W82-44-02 (center of site)
7. STREAM NAME: East Fork Little Sandy River WATERSHED SIZE (in acres): 6620
8. LINEAR FEET OF STREAM IMPACTED: 3159
9. DIRECTIONS TO SITE: Traveling east on I-64, take Exit 185 (Cannonsburg exit) in Boyd County, and turn right onto Highway 180/Highway 3, heading south. Continue south on Highway 3 to Lawrence County (Highway 180 becomes Highway 3 at the community of Mavity in Boyd County). Travel approximately 4.5 miles south and east from the Boyd-Lawrence County line to the intersection of Highway 3 and Route 1496. Turn right onto Route 1496 and travel 100 yards to the first bridge. The project's upstream end begins at the bridge.

10. IS ANY PORTION OF THE REQUESTED PROJECT NOW COMPLETE? ☐ Yes ☒ No If yes, identify the completed portion on the drawings you submit and indicate the date activity was completed. DATE _____
11. ESTIMATED BEGIN CONSTRUCTION DATE: _____ March 2009
12. ESTIMATED END CONSTRUCTION DATE: _____ May 2009
13. HAS A PERMIT BEEN RECEIVED FROM THE US ARMY CORPS OF ENGINEERS? ☐ Yes ☒ No If yes, attach a copy of that permit. An application has been submitted for a NWP#27.
14. THE APPLICANT MUST ADDRESS PUBLIC NOTICE
- (a) ☒ Public notice in newspaper having greatest circulation in area (provide newspaper clipping or affidavit)
_____ Adjacent property owner(s) affidavits (Contact Division of Water for requirements.)
- (b) _____ I REQUEST WAIVER OF PUBLIC NOTICE BECAUSE:

Contact Division of Water for Requirements.
15. I HAVE CONTACTED THE FOLLOWING CITY OR COUNTY OFFICIALS CONCERNING THIS PROJECT:
Tim Ellis, local floodplain coordinator
Give name and title of person(s) contacted and provide copy of any approval city or county may have issued.
16. LIST OF ATTACHMENTS: _____
List plans, profiles, or other drawings and data submitted. Attach a copy of a 7.5 minute USGS topographic map clearly showing the project location.
A copy of the mitigation plan, which includes all appropriate drawings and descriptions of the proposed work, existing stream assessments, and field collected data.
17. I, _____ (owner) CERTIFY THAT THE OWNER OWNS OR HAS EASEMENT RIGHTS ON ALL PROPERTY ON WHICH THIS PROJECT WILL BE LOCATED OR ON WHICH RELATED CONSTRUCTION WILL OCCUR (for dams, this includes the area that would be impounded during the design flood).
18. REMARKS: _____ A flood analysis was not required by the Floodplain Section.

I hereby request approval for construction across or along a stream as described in this application and any accompanying documents. To the best of my knowledge, all the information provided is true and correct.

SIGNATURE: _____

Owner or Agent sign here. (If signed by Agent, a Power of Attorney should be attached.)

DATE: _____

SIGNATURE OF LOCAL FLOODPLAIN COORDINATOR: _____

Permit application will be returned to applicant endorsed by the local floodplain coordinator.

DATE: _____

9.22.08

SUBMIT APPLICATION AND ATTACHMENTS TO:

Floodplain Management Section
Division of Water
14 Reilly Road
Frankfort, KY 40601

The BIG SANDY NEWS

115 Louisa Plaza • Suite #4 • P.O. Box 766 • Louisa, KY 41230
(606) 638-4581 • Fax: (606) 638-9949 • email: bsnews@foothills.net

AFFIDAVIT OF PUBLICATION

I, Tony Fyffe, hereby certify that I am the editor of THE BIG SANDY NEWS.

I further certify that a Public Notice for The Kentucky Department of Fish & Wildlife was published December 5, 10 & 12 in THE BIG SANDY NEWS. IN TESTIMONY WHEREOF, witness my signature this Dec. 18, 2008.

THE BIG SANDY NEWS

SIGNATURE

Tony Fyffe

SUBSCRIBED AND SWORN TO BEFORE ME BY

Tony Fyffe

THIS THE 18 DAY OF December, 2008.

NOTARY PUBLIC

Mayorie P. Hale

MY COMMISSION EXPIRES:

August 22, 2010



**COMMERCE CABINET
KENTUCKY HERITAGE COUNCIL**

Steven L. Beshear
Governor

The State Historic Preservation Office
300 Washington Street
Frankfort, Kentucky 40601
Phone (502) 564-7005
Fax (502) 564-5820
www.kentucky.gov

Marcheta Sparrow
Secretary

December 12, 2008

Mr. Keith Crim
T.H.E Engineers
973 Beasley Street
Suite 130
Lexington, Kentucky 40509

RE: East Fork Little Sandy River #4 Mitigation Site, Lawrence County

Dear Mr. Crim:

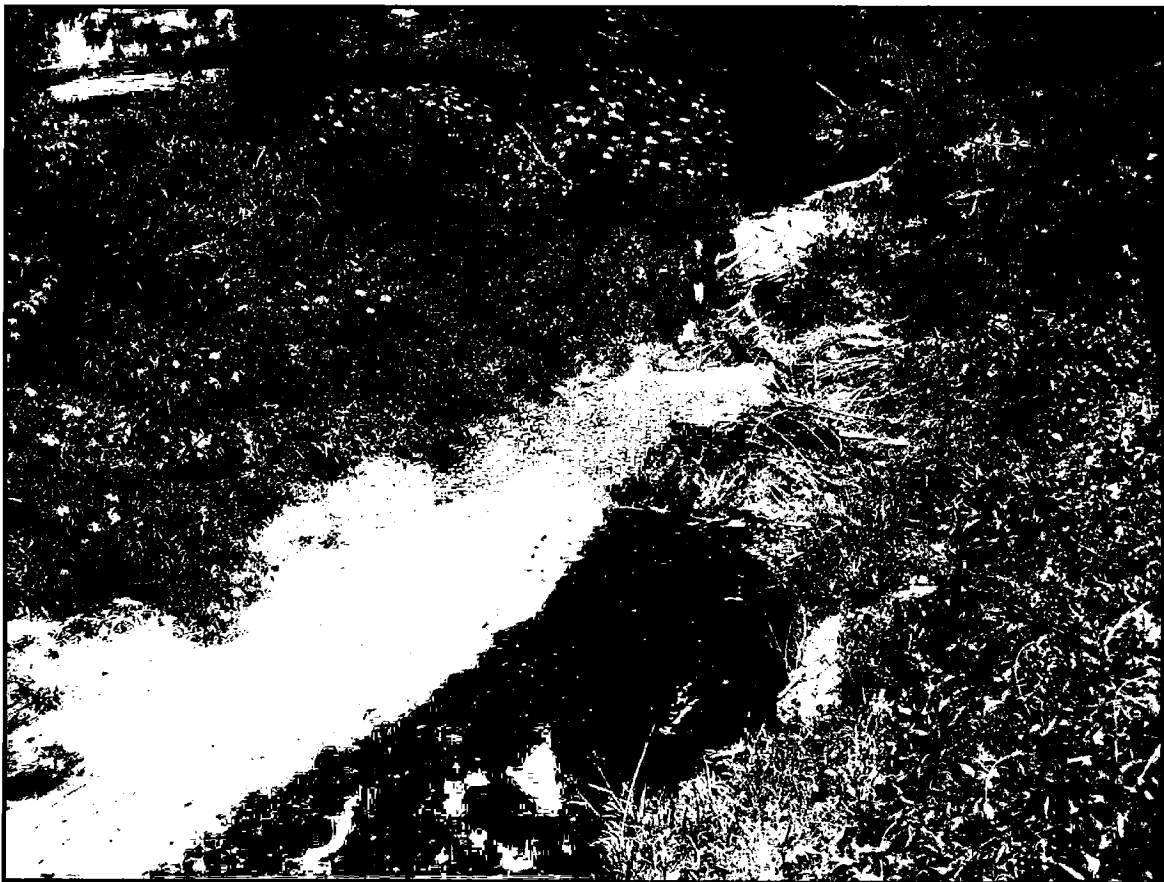
Mr. Eric Schlarb with the Kentucky Archaeological Survey recently conducted an on-site visit for a proposed stream and wetland mitigation project along the East Fork Little Sandy River in Lawrence County, Kentucky. On the basis of his examination of the proposed project area he determined that the stream had moved around in the past and he found no evidence of cultural remains. In light of this information, an archaeological survey of the proposed project area is not needed. In accordance with 36CFR Part 800.4 (d) of the Advisory Council's revised regulations our finding is that there are No Historic Properties Present within the undertaking's area of potential impact. Therefore, we have no further comments and the Agency Official's responsibility to consult with the Kentucky State Historic Preservation Officer under the Section 106 review process is fulfilled.

Should you have any questions, feel free to contact David Pollack of my staff at (502) 564-7005.

Sincerely,

Mark Dennen, Acting Executive Director,
Kentucky Heritage Council
and State Historic Preservation Officer

**Mitigation Plan
For the
East Fork Little Sandy River #4
Lawrence County**



**For the
Kentucky Department of Fish and Wildlife Resources**

November 2008

**Mitigation Plan
For East Fork Little Sandy River Site #4
Lawrence County, Kentucky**

Introduction

The Kentucky Department for Fish and Wildlife Resources (KDFWR) proposes to restore approximately 3159 linear feet of existing degraded stream in Lawrence County, Kentucky (Exhibit 1). This project is part of KDFWR efforts in utilizing In-Lieu-Fee (FILO) Trust funds to provide stream mitigation as set forth in their 2002 agreement with the U.S. Army Corps of Engineers, Louisville District (Corps).

The stream mitigation credit (ecological lift) derived as a result of the proposed restoration activities on East Fork Little Sandy River will be used to offset mitigation required for previous impacts to waters, in the Little Sandy-Big Sandy River basins, for which in lieu fees were assessed.

Section 1: Goals and Objectives of the Proposed Mitigation

A. Functions & Values

Proposed stream mitigation include restoration of 3159 feet of existing, degraded channel into a more natural channel approximately 2913 feet in length (see accompanying stream channel mitigation plan and design sheet(s)). The focus of the restoration project is to construct a meandering stream with good in-stream habitat and stable streambanks, that conveys the bankfull discharge and sediment supplied, and has the channel-floodplain interaction to the desired recurrence interval of approximately 1.2 to 1.5 years. The current stream habitat value, using the EPA Rapid Bioassessment Protocol, is 79. The predicted stream habitat values have been provided in the Stream Success Criteria table (Appendix 5). The predicted values represent the habitat improvement targets by which the success of the stream mitigation effort will be measured during the monitoring period. Channel morphology will be restored to lie within the central tendency of natural channels for the valley type and hydrology present, including meander pattern (sinuosity, radius of curvature, wavelength, and meander arc length), riffle-pool morphology, and section geometry (width-depth ratio, section asymmetry at pools, etc.).

The information and guidance provided in the EPA RBP was used to complete the "Habitat Assessment Field Data Sheet - High Gradient Streams" (Data Sheet) for East Fork Little Sandy River. The RBP score was compared to ranges provided by the

Louisville District Corps. The pre-project Data Sheets show that East Fork Little Sandy River scored relatively low and would be categorized as "Poor". The low habitat scores are due to the fact that the reach has been partially channelized (straightened), has high erosion potential (incised in areas with vertical banks), heavy deposition of sand/silt material, and little to no forested riparian area. The predicted RBP score for the restored stream (Appendix 6 – Estimate Stream Credit) is in the "Excellent" range. Post-project Data Sheets will be completed as part of the final monitoring report.

B. Functional Gains

Stream functional gains will be determined by collecting stream habitat data using the EPA Rapid Bioassessment Protocol for the restored stream reach and compare pre-project stream habitat values to the post-project values. Stream functional gains will be credited as the net gain in functions and values, on a linear foot basis, consistent with the protocol used by the Louisville District. Estimated stream credit (ecological lift) for the site is included in Appendix 6.

Final stream mitigation success will be determined by the Corps and KDOW; based on site conditions at the end of the monitoring period. This information will be provided to KDFWR.

C. Potential Challenges

Specific to this project is the challenge of providing a design that addresses the need to stabilize the streambed and provide a channel that adequately transports the sediment load of the stream. The site is located on private properties, so there is a need to address the concerns of multiple landowners. One property owner, while not opposed to the project, opted not to participate; so design and construction must address the need to leave that property undisturbed.

The construction of stream restoration projects where channel relocation occurs in close proximity to the existing stream is inherently challenging, due to concerns over maintaining/managing current flows while minimizing excessive sedimentation and erosion. In addition to standard erosion prevention and control BMPs (e.g., silt fencing, erosion control blankets), the use of temporary diversions channels and a "pump around" may be proposed so that stream channel construction is performed "in the dry".

If a drought occurs during the construction or monitoring period, then steps will be taken to ensure proper watering of the riparian zone plantings is performed.

Sufficient remedial and contingency plans and adaptive management are incorporated in the plan to ensure that all likely challenges, such as potential effects from invasive species or stream channel instability, can be quickly addressed during the five year monitoring period. At the end of the five-year monitoring period, if mitigation is only partially successful or unsuccessful, KDFWR will submit a Contingency Plan to the Corps and KDOW or propose to extend the monitoring period beyond five years until

such time as the Corps determines the project is successful. The plan or extension of monitoring will not be implemented without prior approval from the Corps and KDOW.

D. Environmental Goals and Objectives

The goal of this project is to restore the stream to a more natural condition by applying appropriate stream restoration principles; resulting in a stable channel that will, over time, neither aggrade or degrade.

Stream restoration on the site is expected to meet the following objectives: (a) to improve in-stream and riparian habitat; (b) to create a natural channel that is in geomorphic equilibrium and exhibits improved channel stability, and (c) to help promote hydrologic connectivity to the floodplain surrounding the restored stream channel.

Section 2: Site Selection

East Fork Little Sandy is a perennial tributary to the Ohio River. The existing stream is considered incised and entrenched, with near vertical banks in areas. Lateral migration of the channel appears to be occurring in several locations. Overall, it has a low sinuosity, especially evident in the upper reach where it appears to have been partially straightened in the past for agricultural purposes; leaving a remnant channel. The bankfull channel width varies from 18 to 30 feet; with an average width of 22 feet. The stream has a mild slope of 0.0015 to 0.0021 ft/ft, with the reach being primarily long pools and short riffles. There are stream segments where active erosion and/or heavy deposition are evident. The riparian zone is very limited along most of its length; with a single row of trees near the bank along the upstream and downstream ends of the project. The site is currently utilized for pasture and/or production of hay.

Collectively, these factors act to reduce the level of stream function on the site. For example, stream functions have been reduced through the removal of adjacent natural forested vegetation. This has reduced its value for wildlife, increased the water temperature, and acts to degrade available in-stream habitat.

A final component of site selection involves the willingness of the property owners to participate in the project. The project, as designed, has the approval of two owners of property at the site.

Section 3: Site Protection

The site is privately owned. The KDFWR and property owners plan to jointly manage the site during the required monitoring period. KDFWR will execute a conservation easement with the owners for the mitigation site to ensure permanent protection of the property.

Section 4: Baseline Information

I. Proposed Impact Site:

A proposed impact site is not associated with this mitigation site. The mitigation site is being developed to address stream mitigation needs in the Little Sandy-Big Sandy River basins, pursuant to the in lieu fee agreement mentioned above. The Corps and KDOW have determined the use of the site is allowed for previous impacts in the Little Sandy River basin. Therefore, no further consideration of a proposed impact site will be included in this plan.

II. Proposed Mitigation Site:

A. Mitigation Concept and Purpose

This project is intended to restore a degraded stream on private lands in Lawrence County, Kentucky; involving approximately 3159 linear feet of existing, degraded stream channel. The existing stream location is shown in Exhibit 2 mapping, and the conceptual mitigation plan is shown in Exhibit 3.

B. Ownership

The site is privately owned (see sub-section K below). The KDFWR and property owners plan to jointly manage the site during the required monitoring period. KDFWR will execute a conservation easement with the owners for the mitigation site to ensure permanent protection of the property.

C. Location

The site is located near the intersection of KY 3 and KY 1469, in Lawrence County, Kentucky. It lies north of KY 1496, and west of KY 3. Coordinates for the center of the site are latitude N38-13-14, longitude W82-44-02. The site lies on the Fallsburg, Kentucky USGS Quadrangle within the Little Sandy River watershed. East Fork Little Sandy is a tributary of the Little Sandy River, which flows to the Ohio River and part of the 05090104 8-digit HUC. Exhibit 1 contains a vicinity map for the site, showing its location relative to major roads. Site specific mapping is found in Exhibit 2.

D. Habitat Classification

Based on the existing channel dimensions, width-depth ratio, and the entrenchment ratio, the stream fits the characteristics of an incised Rosgen G5 type channel.

E. Existing Conditions

The existing stream is considered incised and entrenched, with near vertical banks in areas. Lateral migration of the channel appears to be occurring in several locations. Overall, it has a low sinuosity, especially evident in the upper reach where it appears to have been partially straightened in the past for agricultural purposes; leaving a remnant channel. The bankfull channel width varies from 18 to 30 feet; with an average width of 22 feet. The stream has a mild slope of 0.0015 to 0.0021 ft/ft, with the reach being primarily long pools and short riffles. There are stream segments where active erosion

and/or heavy deposition are evident. The riparian zone is very limited along most of its length; with a single row of trees near the bank along the upstream and downstream ends of the project. The site is currently utilized for pasture and/or production of hay.

These factors, collectively, act to reduce the level of stream function on the site. For example, stream functions have been reduced through the removal of adjacent natural forested vegetation. This has reduced its value for wildlife, increased the water temperature, and acts to degrade available in-stream habitat.

F. Field Observations and Data

The EPA Rapid Bioassessment Protocol was utilized to determine stream habitat quality. The high gradient data sheets were used. The stream data sheets are included as Appendix 1. The assessments were performed on approximate 1000 foot intervals to provide conditions for the entire project reach. Additional stream data were collected to develop the stream design, including channel substrate data and channel profiles and cross-sections. See Appendix 3 for sediment data.

G. Water Quality

Conductivity and pH were measured in the late summer of 2007, yielding values of 204.2 μ mhos/cm and 6.8 respectively. This would indicate that water quality should be adequate to support aquatic life.

H. Functional Assessment Tools

Streams will be assessed using the EPA Rapid Bioassessment protocol and its high gradient data sheets to determine if the habitat functions and values of the restored stream reaches have improved to expected levels. Additional success criteria, as described elsewhere in this plan, will also be monitored.

I. Soil Information

The site has been converted to pasture/hay production. Soil types that occupy areas that are proposed for restoration are the Hayter-Grigsby complex (HaC), 2 to 15 percent slopes, and the Grigsby (Gr) fine sandy loam, frequently flooded. The HaC soils are located in the upstream half of the project site, and the Gr soils in the downstream half. A map of the soil types is included as Exhibit 5.

Hayter soils lay within the valley bottom along stream terraces and floodplains, and are often associated with other soil types, like Grigsby, in a complex. The Hayter soils are typically very deep loams; well drained, with a low or moderate moisture-supplying capacity. They are high in natural fertility and easy to till. These soils suit row crops and hay production, but frequent flooding may limit production. These soils pose slope and erosion management concerns. The Grigsby soil is a very deep sandy loam; well-drained, and has a moderate moisture-supplying capacity. They have a medium natural fertility and are also suitable for crops/hay production; however, production again may be limited due to frequent flooding. For both soil types, flood-tolerant species are recommended for planting in the floodplain to minimize erosion and soil

loss, and are suitable to woodland production.

J. Photographs

Photographs of the site have been included in Exhibit 4, taken at assessment points.

K. Responsible Parties

1. Applicant

Kentucky Department for Fish & Wildlife Resources
Attn: Mr. Benjy Kinman
1 Sportsman's Lane
Frankfort, Kentucky 40601
502/564-3400

2. Party Responsible for Mitigation Plan Design

HMB Professional Engineers
Attn: Mr. Robert Dowler, P.E.
3 HMB Circle
Frankfort, Kentucky 40601
502/695-9800

T.H.E. Engineers, Inc.
Attn: Mr. David Heil, P.E., President
973 Beasley Street, Suite 130
Lexington, Kentucky 40509
859/263-0009

3. Party Responsible for Mitigation Plan Implementation, Success & Credit/Debit Tracking

Kentucky Department for Fish & Wildlife Resources
Attn: Mr. Benjy Kinman
1 Sportsman's Lane
Frankfort, Kentucky 40601
502/564-3400

4. Property Owner(s)

Kevin McCormick, and Eugene Horton
Attn: c/o Mr. Kevin McCormick
Route 4, Box 11820
Louisa, Kentucky 41230
606/686-3500

Section 5: Estimated Ecological Lift

The Estimated Ecological Lift table (Appendix 6) indicates the benefit expected as a result of the proposed project, utilizing the Louisville District COE's Eastern Kentucky Protocol (EKP). The EKP calculates Ecological Integrity Units (EIU's) for the existing and proposed conditions of the stream; the difference indicating the resulting benefit or "ecological lift". The "Pre-project" condition and/or quality of the stream is based on

assessments of the existing using EPA's Rapid Bioassessment Protocol (RBP). The results of the RBP's identify the quality of the stream; and for purposes of the EKP, its Habitat Integrity Index (HII). Utilizing this index and an indication of water quality (conductivity reading), the EKP calculates an Ecological Integrity Index (EII). Consequently, the Ecological Integrity Units are determined by applying the EII ratio to the length of the expected impact. This East Fork Little Sandy River, as assessed, was found to be poor (with an RBP score of 79). The score, as applied to perennial streams, results in an EII of 0.47. The expected impact length is multiplied by the ratio to provide a final EIU of 1485. For determining the EIU's resulting from the project, a similar approach is used, with the exception being an assumed RBP score based on expected final project results. In the cast of East Fork, the goal of the mitigation project is to achieve a RBP score of 191 or higher; resulting in an "excellent" quality rating for the stream. This would result in an EII of 0.92 to be applied to the final expected length of new stream channel. The final, "Post-project" EIU is 2680; with an ecological lift of 1195 EIU's.

Section 6: Mitigation Work / Implementation Plan:

I. Site Preparation:

A. Plans

KDFWR has developed an integrated plan that would result in the complete restoration of the site's stream. In partnership, the engineering firms HMB and T.H.E. designed the stream restoration and collected the necessary stream data using on-site and other data sources.

KDFWR will construct the permitted stream in accordance with the approved plans, and will not make any significant field changes without the prior approval of the Corps and KDOW. KDFWR and/or their consultant will be on-site during the entire construction process and will be supported as needed by a staff ecologist or biologist. During construction, KDFWR and/or their consultant will ensure the use of standard erosion control methods that are applicable to the mitigation site.

Description of plans for the following criteria:

1. Grading – The site will be graded to the dimensions shown on the plans, which include stream gradient, bankfull channel, floodprone area, point bar and riffle slopes.

2. Hydrologic changes – Temporary hydrologic changes will occur during construction from use of diversion channels and/or "pump around" (the extent of which will be determined by the contractor and engineer in charge). Changes will include opening the new channel to flow and plugging the existing channel as construction progresses in either an upstream or downstream direction. A hydrologic change will result from the use of a more appropriate channel width and from raising the channel bottom above bedrock above and below the undisturbed stream segment on private property.

3. Water control structures – There are no anticipated permanent water control structures. Temporary water control structures may be used to manage flow during construction (i.e., utilizing a “pump around” during construction requiring a temporary damming of the existing channel to cutoff flow for pumping to a point downstream. This operation would be repositioned as necessary while construction progresses).

4. Exotic vegetation control – Exotic vegetation control will involve an initial eradication by use of herbicides. The riparian zone will be limited to no more than 10 percent of exotic invasive species present during the final vegetation cover survey. Invasive species observed during the monitoring period will be controlled by spot application of herbicides and/or manual removal. The species to be controlled are those indicated as level 1 (Severe Threat) and 2 (Significant Threat) on the list produced by the Kentucky Exotic Pest Plan Council.

5. Erosion control – Geojute erosion control fabric will be installed beginning two feet from the edge of bankfull and extend to the toe of slope of the channel. Silt fencing or other erosion control measures will be constructed, as necessary, along the design channel and riparian corridor and around temporary material stockpiles to prevent the transport of disturbed soils into the design channels. These silt fences and other erosion control methods will be maintained as necessary to ensure their functionality. Other areas will be seeded and mulched as described in detail elsewhere in this document.

6. Bank stabilization – Bank stabilization will be accomplished through the use of erosion control fabric as described above, root wads, and log vanes; as well as rock toe structures along the outside of bends. Grade control structures, in the form of constructed riffles and cross-vanes, are to be utilized to stabilize the streambed.

7. Equipment and procedures to be used – A variety of common equipment and tools will be used as site conditions dictate. Prior to channel construction, the site will be mowed to allow easy access, being especially cautious not to disturb the survey benchmarks established on the site. The channel thalweg will then be laid out in plan form. Stakes with flags will be installed to mark the thalweg and radius points for the design channel. The bankfull channel will then be constructed to the depth and cross section dimensions prescribed in the design. Following the construction of all bankfull design sections, the design channel profile and cross sections will be surveyed and checked against the design values. This process will be repeated until the constructed channel profile and dimensions matches, within an acceptable tolerance, that of the design. Due to the length of the project, it will be necessary to define discrete reaches within the project that can be constructed to prescribed stages before moving on. In this way the project can be constructed while minimizing the amount of flow diversion or pump around, as well as maximizing the efficiency of erosion control and implementation of vegetation. Once this is accomplished, the erosion control blankets and silt fencing will be installed. Riparian vegetation will then be planted.

8. Site access control – The site is protected by the owners against vandalism. Public use and access is not a concern due to the topography, remoteness of the site, and presence of property owners on site. The KDFWR and/or their consultants will monitor access to the site during the construction phase to ensure that damage or vandalism does not occur.

9. Strategy for minimizing soil compaction – It is not anticipated that construction will utilize heavy equipment. Soil compaction will be localized and center around design channels. If necessary, light disking or scarification of planting and seeding areas will be performed to ensure suitable soil conditions. Additionally, should compaction become an issue, holes for trees and shrubs can be over-excavated and loosely backfilled to facilitate root development.

10. Stream Pattern, Profile, and Dimension – Design stream pattern, profile, and section dimensions were determined by the HMB/T.H.E. engineering team. These parameters are given in Table 1, and based on morphological data and natural stream design concepts.

B. Soils/Substrate

The existing stream substrate consists predominantly of sand and gravel, with lesser amounts of silt/clay material present. Information on the particle size distribution is found in Appendix 3. The existing channel has relatively little morphologic variation compared to natural channels, but a riffle/pool morphology is present.

C. Hydrology

1. Identification of the source of hydrology/water supply, estimated size of the watershed, and connections to existing waters – The watershed for the project site is approximately 10 square miles. Sources for stream hydrology are direct run-off and groundwater. East Fork flows approximately 39.5 miles downstream, from the lower project limit, to the Little Sandy River.

2. General information on the average frequency, depth and duration of water available to the site under normal conditions – Existing information on normal flow conditions could not be found, however, the observed flow depths during field visits ranged from 0.1 feet to 3.0 feet (at pools). Because of the size and nature of the upper watershed (narrow valleys with steep slopes), it appears that East Fork reacts moderately quick to significant rainfall. Discharge information, obtained from the USGS Kentucky Water Science Center, indicates a Q2 = 822 cfs, and a Q100 = 2720 cfs.

3. Need for groundwater monitors/piezometers to help evaluate groundwater elevations and/or flow – While groundwater does contribute to stream flow, the contribution from the immediate project area is not significant; therefore, installation of piezometers was not included in the plans. The significant source of flow for the stream comes from the 10 square mile drainage area above the site, whether it is groundwater, direct runoff, or a combination. If deemed necessary by the Corps or KDOW, they can be added. Flow

monitors are not necessary because the stream is perennial and flow patterns have been adequately documented through a series of prior site visits during several seasons of the year.

D. Planting Plan

KDFWR will restore vegetation to the site. The riparian corridor along the stream will average 18.5 feet on each side of the channel (easements granted by the property owners limit the zone width). It should be noted that a 950 foot reach (between approximate Stations 100+50 and 110+00) will be planted on the west side only. The east side of the channel has an existing riparian zone that will not be impacted. The general plan is as follows:

1. The riparian area will be planted in late fall or winter with a minimum of 630-three (3) gallon container grown bare-root seedling trees per acre (planted on an approximate 6' by 6' spacing, with every fourth site substituted with a shrub). They will be planted in a staggered or irregular pattern. A table with a list of chosen species is incorporated into the plans. The table lists both scientific and common names for the native species to be planted. Approximately 1000-three (3) gallon container grown shrubs per acre will be planted, interspersed with the trees in the riparian area, and as the first row of woody species outside the bankfull channel (see Exhibit 3G).
2. The contractor will determine the source of seeds and plantings. Only native plant species will be planted. KDFWR personnel/or their consultant will inspect the plantings before installation. Annual rye grass may be used in addition to the native seed mix to establish quick cover.
3. All of the planted trees will come from the list in Appendix 4, and no species will comprise more than 20 percent of the total initial planting. Planting locations or layout are shown on a planting plan detail sheet. They typically will begin at bankfull elevations, or two feet from the edge of stone protection, and extend to the limit of the defined riparian zone. Mostly facultative or wetter species have been selected due to the site being entirely in the floodplain and the soil types present.
4. Transplanting is not proposed for this project. The existing trees are native species, and efforts will be made to leave as many as possible.
5. Expected volunteers species include sycamore, walnut and box elder. This is based on species that currently exist in the area.

E. Exotic and Undesirable Species Control

KDFWR and/or their consultants will ensure that invasive species will not affect the future condition of the restored stream and riparian zone. The species to be controlled are those indicated as level 1 (Severe Threat) and 2 (Significant Threat) on the list produced by the Kentucky Exotic Pest Plan Council. Efforts to reduce introduction will consist of cleaning equipment before it reaches the site, inspecting labels on seed

mixtures and mulch for composition. If exotic vegetation establishes, eradication techniques include spraying or manual/mechanical removal. Monitoring for invasive species will take place during the biannual vegetation conducted on the site.

F. Schedule

Construction associated with restoration of the stream is tentatively scheduled to begin in the spring or summer of 2009, if the necessary permits are received from the Corps and KDOW. Tree seedlings would be planted in the fall of 2009 if construction is completed by the end of summer. The initial monitoring of the site will commence in the first full growing season post initial planting and will consist of data collected during the beginning and end of the growing season. Depending on the completion of construction and the tree planting, monitoring schedules will be adjusted accordingly.

G. Construction Monitoring

KDFWR and/or its consultant will monitor the construction activities to ensure that all aspects of the approved mitigation plan are completed without incident. To accomplish this, KDFWR will require on-site management of the construction personnel by one or more people familiar with the design of the project. These representatives will include the KDFWR Project Manager and their consultants and others familiar with the project that have complete knowledge of the mitigation and design plans and some understanding of soil science, hydrology, botany or plant ecology.

II. As-Built Conditions:

KDFWR will submit a report, including construction documents, to the Corps and KDOW within six (6) weeks of completion of site preparation and planting; describing as-built plans and profiles of the mitigation project, locations of final plantings, structures and other mitigation features, final lengths and areas of restored stream. Separate reports for grading and planting work will be submitted if these are not completed within six weeks of each other. KDFWR will include any deviations from the original plan that will affect the predicted stream credit. Appendix 6 will be revised based on the "as-builts", reflecting any deviations from the predicted stream credit. This "as-built" credit will be the basis of the annual tracking of the success criteria. The initial planting report will not be considered as a monitoring report.

KDFWR shall also provide topographic maps showing as-built contours for the restored stream and adjacent riparian area. This would entail measurements of stream pattern, profile, and channel dimensions.

Section 7: Success Criteria / Performance Standards

The success criteria/performance standards discussed and shown in Appendix 5 identify and define the specific criteria for measuring the success of the mitigation effort. The criteria will be measurable and achievable.

Minimum Success Criteria:

The success criteria for the stream is based on the three primary factors: (1) meeting stream channel geomorphology design characteristics to ensure stream stability and function, (2) achieving predicted habitat assessment scores, and (3) ensuring the adequate establishment of a functional riparian area. The success criteria are shown in Appendix 5. These criteria are believed adequate to justify expected stream stability and habitat improvements.

Section 8: Monitoring

I. Monitoring Reports: KDFWR will provide an annual report, based on data collected twice per growing season, to the Corps and KDOW by December 31 for each previous year of the 5-year monitoring effort. The annual report will be based on information collected by KDFWR and/or their consultant as described below. The first monitoring report will be completed after the first full growing season following the initial planting of tree seedlings.

Upon submittal of the final annual report, KDFWR will request Corps and KDOW release from further monitoring. The final annual report will include an explanation of how the goals of the mitigation have been met, a discussion of the stream ecosystem's ability to be self-sustaining, and a comparison of the mitigation site's stream both pre- and post-project using the same functional assessment method. An inspection of the site will then be coordinated with KDFWR, their consultants, and the property owners; and conducted by the Corps and KDOW to confirm the successful completion of the mitigation plan. Upon the Corps and KDOW review, and confirmation of the successful completion of the mitigation plan, KDFWR will be released from additional monitoring and reporting requirements.

A. Timing

KDFWR and/or their consultants will conduct biannual vegetation inspections with one inspection occurring in the first month and one in the last month of the growing season for each calendar year. Photographs will be taken of the vegetation monitoring plots to get an early-in-the-year record and observe any new problems. KDFWR and/or their consultants will also make several site inspections at the beginning of the growing season during each year of the monitoring period to monitor hydrology. The vegetation monitoring data will be collected during both early and late season site visits and will be included in the annual monitoring report.

B. Monitoring Methods

KDFWR and/or their consultants will monitor stream hydrologic characteristics and stability as necessary and appropriate to determine if stream success criteria are being met. For riparian vegetation, the following vegetative monitoring procedures and protocols will be used:

- Four (4), permanent 0.25 acre vegetation monitoring plots will be created within the restored riparian areas, two in the upper reach and two in the lower reach of the project. These vegetative monitoring plots will be monitored bi-annually, during the early and late growing season for the duration of the monitoring period. If the vegetative success criterion is not met, remedial actions will be taken to meet the vegetative success criterion. All proposed vegetative remedial actions will be approved by the Corps and KDOW.

- A center stake will be established to mark the location of each monitoring plot, and photographs will be taken of these plots annually from a point 25 feet away and due west of the center stake.

- The number of planted hardwoods and the number of volunteer hardwoods of targeted species present will be counted within each plot during each growing season of the monitoring period.

- A qualitative vegetation monitoring survey will also occur at the beginning and end of the growing season. This survey will serve to (a) identify the plant species occurring on the site during both the early and late growing season so that a complete vegetation list can be derived, and (b) provide a bi-annual screening for invasive species, so that those species can be addressed or treated as may be necessary at the earliest possible time.

C. Documentation

KDFWR and/or their consultants will document the conditions at the mitigation site and provide a written summary of how the site meets or does not meet the goals and objectives of Section 1 of this plan. The initial report will include a discussion of any deviations from the Mitigation Work/Implementation Plan (Section 6). The following format and sequence will be used in the development of the monitoring report:

1. Soils/substrate – Pebble counts and bar samples will be collected to determine if the size distributions are approximate to those assumed for the design channels.

2. Vegetation – Riparian vegetation conditions observed during the monitoring effort will be identified and compared to pre-project vegetation conditions and to the vegetation success criteria. KDFWR and/or their consultants will assess how the success criteria are being met; including, but not limited to, percent native tree species, maximum percent invasive species, minimum native tree stem density per acre, maximum percent any one tree species, survival rate of planted tree species, ratio of planted tree species vs. volunteer tree species, and percent vegetative cover. KDFWR and/or their consultants will also include a species composition list including both scientific and common names.

3. Hydrology – Hydrologic conditions observed during the monitoring effort will be identified and compared to the hydrologic success criterion. KDFWR and/or their

consultants will describe the sources of hydrology (e.g. precipitation, overbank flooding, groundwater) that are or appear to be affecting the site and include information on surface water depth.

4. Channel geomorphology – KDFWR and/or their consultants will describe the as-built profiles, cross sections, in-stream habitat characteristics, and substrate composition. The discussion will related specifically to the Success Criteria (Appendix 5) and will provide sufficient detail for a reasonable person to judge whether or not the anticipated stream type(s) were restored and that those streams are stable. The restored channels will be visually inspected at least quarterly during the first two years after construction and semi-annually for the remainder of the monitoring period to identify potential signs of instability. Photographs of the stream channels will be taken to document changes in the channels, especially sites where instability may be occurring.

5. Remediation – KDFWR and/or their consultants will describe any remedial measures that will be necessary to ensure successful establishment the restored streams on the site.

D. Responsible Parties

1. Applicant

Kentucky Department for Fish & Wildlife Resources
Attn: Mr. Benjy Kinman
1 Sportsman's Lane
Frankfort, Kentucky 40601
502/564-3400

2. Party Responsible for Oversight of Construction of Mitigation

Kentucky Department for Fish & Wildlife Resources
Attn: Mr. Benjy Kinman
and,

HMB Professional Engineers
Attn: Mr. Robert Dowler, P.E.
3 HMB Circle
Frankfort, Kentucky 40601
502/695-9800

T.H.E. Engineers, Inc.
Attn: Mr. David Heil, P.E.,
973 Beasley Street, Suite 130
Lexington, Kentucky 40509
859/263-0009

3. Party Responsible for Mitigation Plan Implementation, Success & Credit/Debit Tracking

Kentucky Department for Fish & Wildlife Resources
Attn: Mr. Benjy Kinman
1 Sportsman's Lane
Frankfort, Kentucky 40601
502/564-3400

II. Assessment of Function/Value Replacement: In the annual report, KDFWR and/or their consultants will use the EPA Rapid Bioassessment protocol of high gradient streams to measure stream and riparian habitat improvements and describe those results in the annual report. If a success criterion is not met for all or any portion of the mitigation area in any year, KDFWR and/or their consultants shall also provide an analysis of the cause(s) of failure and any proposed remedial action(s). The annual report will also include photographs of each monitoring plot.

III. Release from Monitoring: Prior to requesting release from monitoring, KDFWR and/or their consultants will conduct a delineation of the mitigation site. The preliminary delineation will be submitted with the final annual monitoring report and will designate the reach and associated riparian zone width restored or enhanced. The Corps and KDOW will then have the opportunity to verify the delineation during a site inspection. If the Corps and KDOW determine the delineation is correct, the boundary will be surveyed, and a certified copy of the final delineation will be provided to the Corps and KDOW. If revisions to the delineation are necessary, the boundary will be remarked during the site inspection and then surveyed, and a certified copy of the final delineation will be provided to the Corps and KDOW.

Section 9: Long Term Management Plan

The stream that is restored and enhanced on the site (including the riparian zone for which credit was given) will be permanently protected and remain undisturbed. The landowners will protect the entire delineated mitigation site through a conservation easement, executed with KDFWR, which permanently protects the mitigation site and significantly restricts the use of the delineated area.

KDFWR will provide funds to permanently mark the boundaries of the mitigation area and place signs stating no mowing, spraying, disturbance, etc., which will include the restored stream and surrounding riparian area. Future management of the site will largely consist of landowners passive management, which will allow the stream and riparian area to develop and evolve naturally.

Section 10: Adaptive Management Plan

KDFWR will take reasonable and appropriate steps to ensure that the stream channel, vegetation, and hydrology are restored on the site in order to achieve the success criteria described above. However, site and other limitations (e.g., engineering considerations and extraordinary flood events) may create situations where stream channel and riparian zone success criteria are not and/or cannot be met fully or in part on portions of the site. This may be an inevitable outcome of this project. KDFWR

recognizes that the Corps and KDOW likely will not give stream credit for those areas that do not meet the vegetative, hydrologic, and stability criteria necessary for the geomorphic, vegetation, and habitat criteria for streams.

The project will be monitored until the Corps and KDOW deem the project is successful. If the objectives of the mitigation plan cannot be met or if a success criterion is not met for any portion of the project in any year, or if the success criteria are not satisfied, KDFWR shall prepare an analysis of the cause of failure. If determined necessary by the Corps and KDOW, KDFWR will propose remedial action to those agencies for pre-approval. KDFWR will then undertake the corrective measures to address or repair the problem(s).

Section 11: Financial Assurances

KDFWR has sufficient funding through the In-Lieu Fee Trust to construct and monitor the mitigation project, and has provided sufficient contingency funds for remedial actions. The property owners have the resources to manage and protect the site in the long-term. The Corps and KDOW hold the applicant, KDFWR, ultimately responsible for project success, including financial assurances.

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- C. NWI Wetland Map
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Exhibit 3 – Conceptual Restoration Design

- A. Upper Reach Plan
- B. Mid Reach Plan
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Exhibit 4 – Photographs

List of Appendices

Appendix 1 – Pre-project EPA Rapid Bioassessment Protocol Data Sheets

Appendix 2 – Preliminary Jurisdictional Determination Sheets

Appendix 3 – Existing Sediment Data Sheets

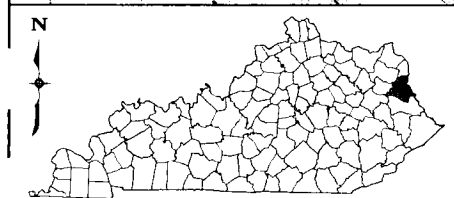
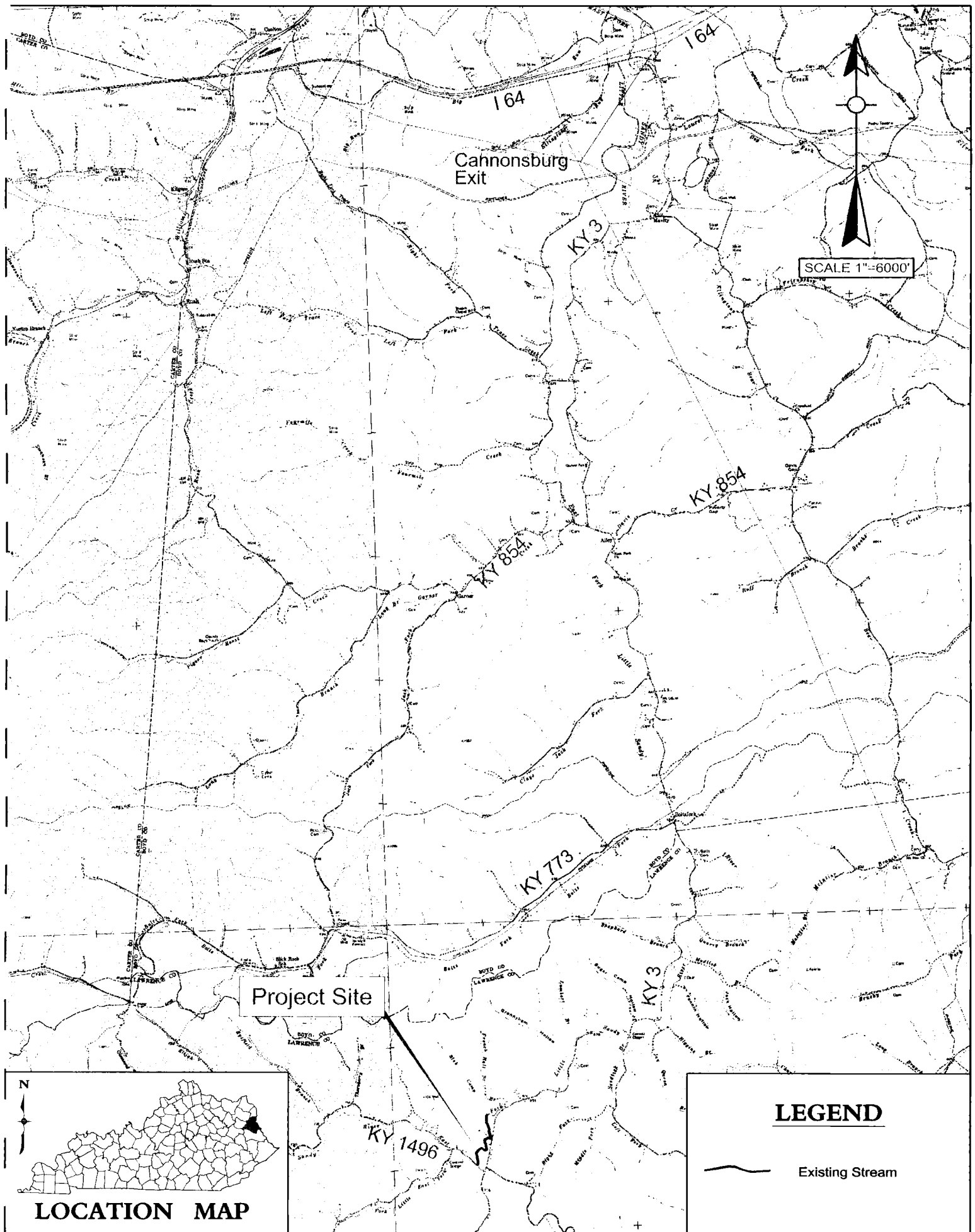
Appendix 4 – Trees and Shrubs to Be Planted

Appendix 5 – Stream Success Criteria

Appendix 6 – Estimated Ecological Lift


Table 1 - Geomorphic Data Summary Sheet

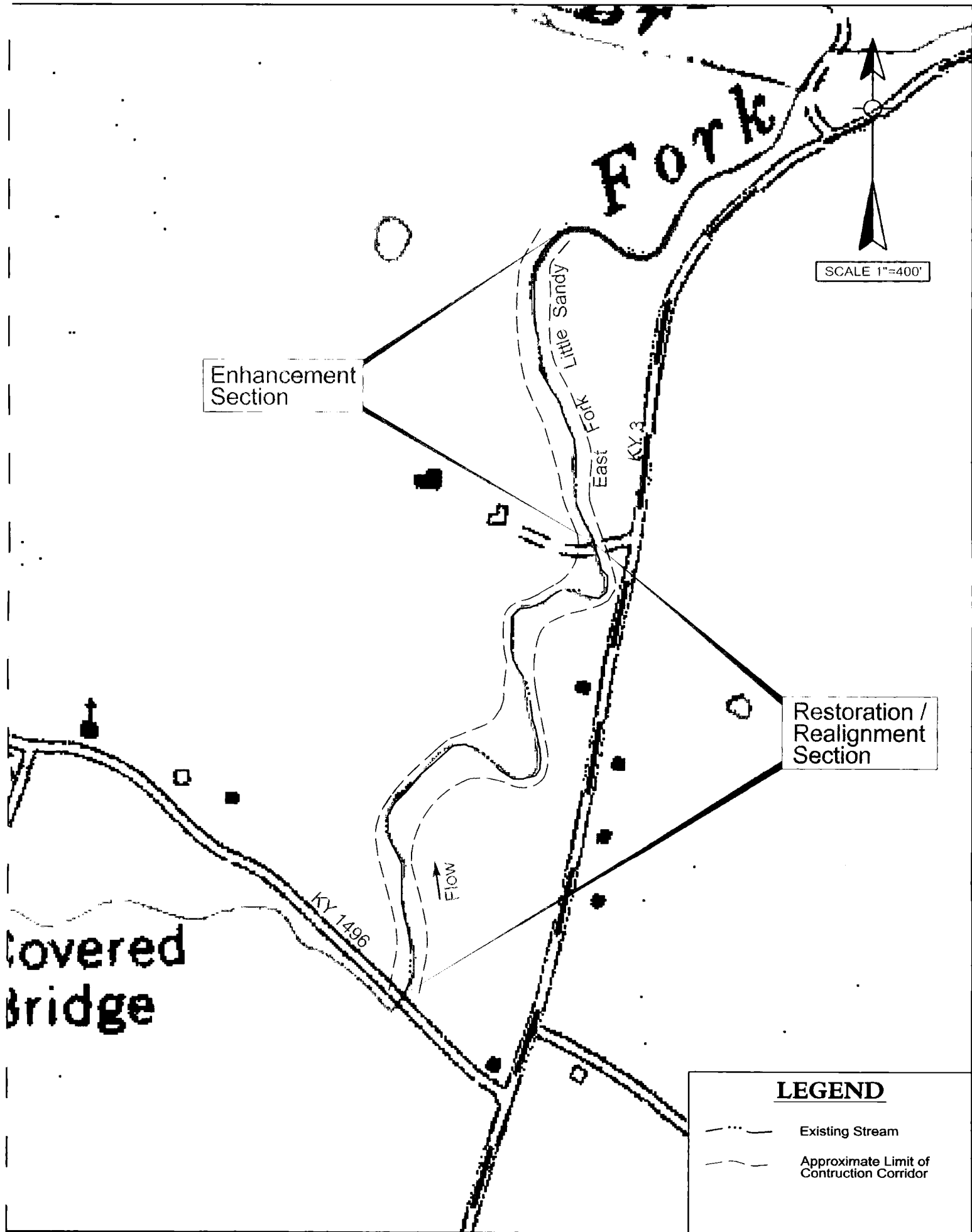
	Existing	Existing	Reference	Proposed	Proposed	As-built (Year 1)	Year 3
Stream Name	EFLSR (Between Bridges)	EFLSR (Bridge to End)	EFLSR	EFLSR #4 (Between Bridges)	EFLSR #4 (Bridge to End)		
Drainage Area (Sq. Mi.)	10.25	10.34	9.88	10.25	10.34		
Rosgen Stream Type (Level II)	G5c	G5c/F5	C5	C5	C5		
Bankfull Discharge Flow (Cbkf)	327	327	294	327	327		
D ₅₀ Riffle/Pavement	12.58	12.58	9.87	25.4	12.58		
D ₅₀ Bar/Subpavement	10.15	10.15	2.9	2.9	2.9		
D ₅₀ Bar/Subpavement	62	62	37	37	37		
T _{cr} * (Eqn. #1)	0.069	0.069	0.029	0.023	0.031		
T _{cr} * (Eqn. #2)	0.009	0.009	0.012	0.015	0.011		
T _{cr}	0.279	0.196	0.146	0.333	0.260		
Channel Slope	0.0021	0.0015	0.0011	0.0020	0.0015		
Valley Slope	0.0027	0.0017	0.0013	0.0027	0.0017		
Riffle Slope	0.0096	0.004	0.006	0.003	0.004		
Pool Slope	0.0002	0.0003	0.0007	0	0		
Sinuosity	1.28	1.13	1.18	1.35	1.13		
Ave. Riffle Depth (@ BKF)	2.37	2.11	2.19	2.79	2.68-3.07		
Max. Riffle Depth (@ BKF)	2.99	2.91	4.20	4.35	4.0-4.24		
Ave. Pool Depth (@ BKF)	2.67	2.31	2.55	3.76	3.56		
Max. Pool Depth (@ BKF)	4.51	4.65	5.09	7.00	5.50		
Belt Width	65.4	47.9	117.0	88.0	26.0		
Radius of Curvature	99.0	44.0	109.0	90.0	48.0		
Meander Wavelength	248.0	122.0	362.0	228.0	127.0		
Floodprone Width	31.0	38.2	290.0	95.0	125.0		
Bankfull Width	21.8	24	41.5	33	26.6-37.8		
Bankfull Area	51.8	50.5	90.6	92.0	73.5-116.2		
Entrenchment Ratio	1.4	1.6	7.0	2.9	3.3-4.7		
Width:Depth Ratio	9.2	11.4	18.9	11.8	9.6-12.3		
Wetted Perimeter	24.3	26.0	42.6	34.5	28.6-39.74		
Hydraulic Radius	2.13	1.94	2.12	2.67	2.56-2.92		



LOCATION MAP

LEGEND

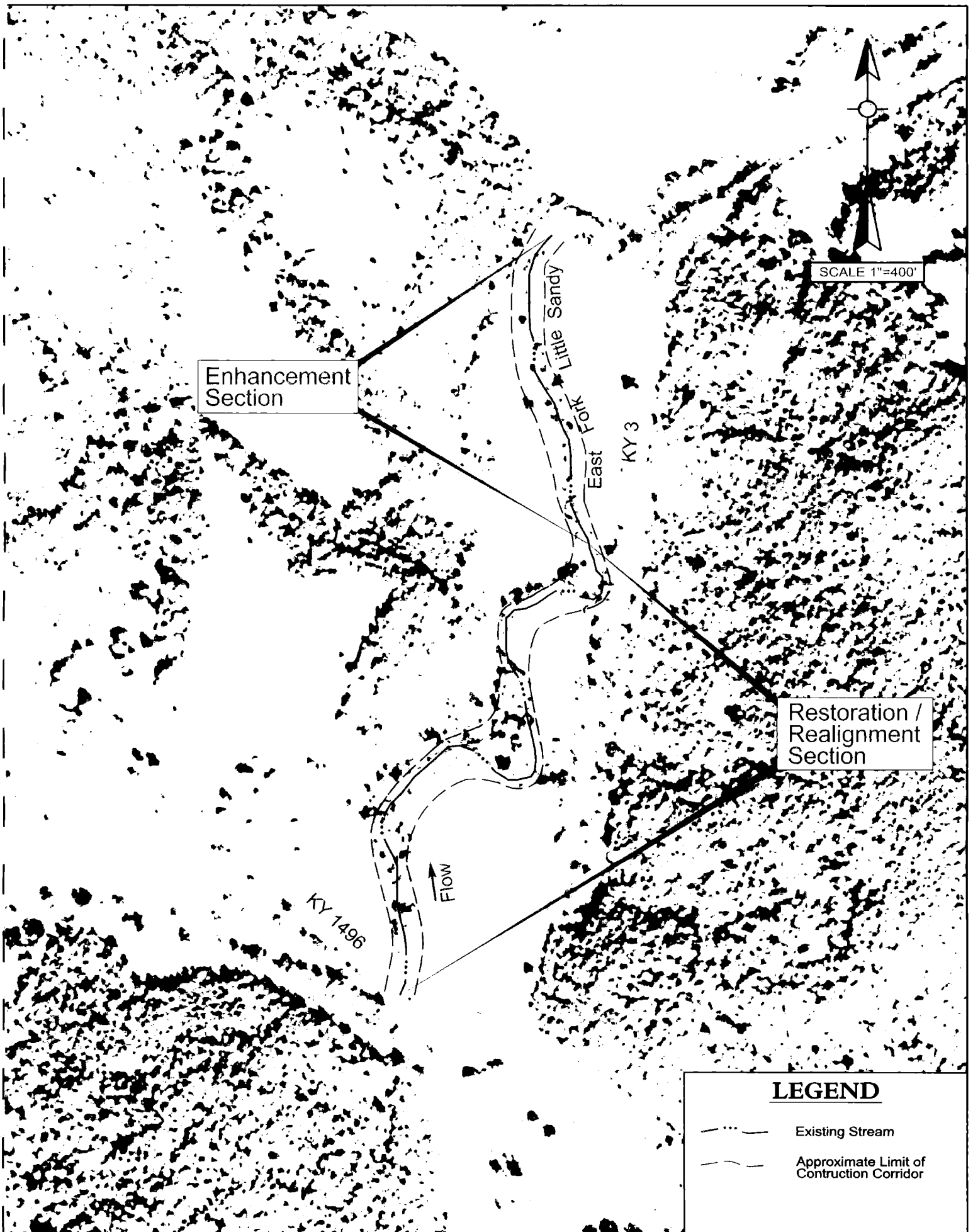
 Existing Stream



Covered
Bridge

LEGEND

- Existing Stream
- - - Approximate Limit of Construction Corridor



Enhancement
Section

SCALE 1"=400'

Restoration /
Realignment
Section

KY 1496

KY 3

Little Sandy

East
Fork

FLOW

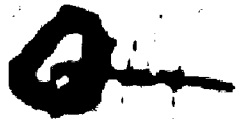
LEGEND

- Existing Stream
- Approximate Limit of Construction Corridor

PUBHx



Enhancement
Section



PUBHh

Little Sandy

East Fork

KY 3

Restoration /
Realignment
Section

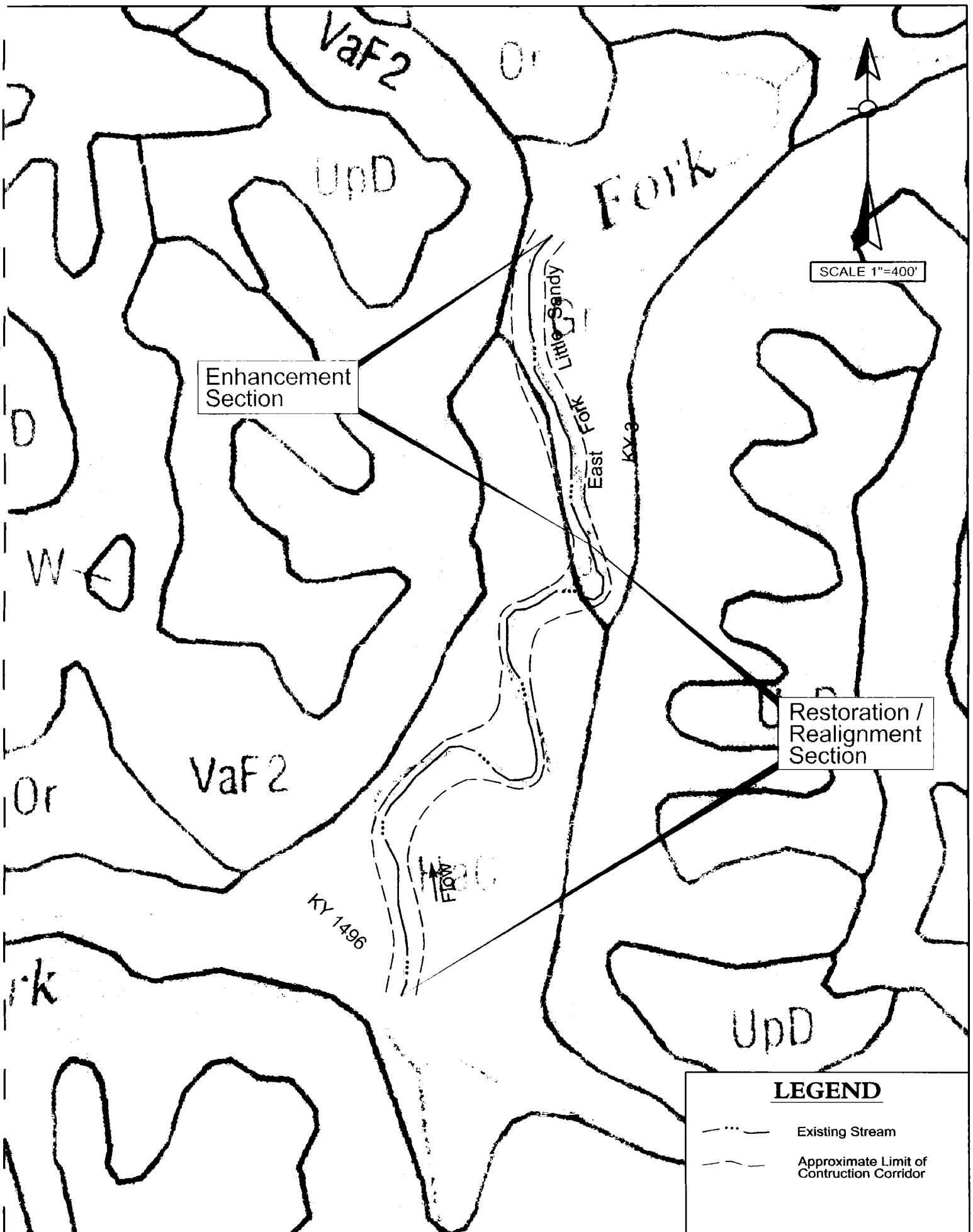
KY 1496

SPFOIA

SCALE 1"=400'

LEGEND

- Existing Stream
- Approximate Limit of
Construction Corridor





SCALE 1"=400'

Enhancement
Section



KY 3

KY 1496

Restoration /
Realignment
Section

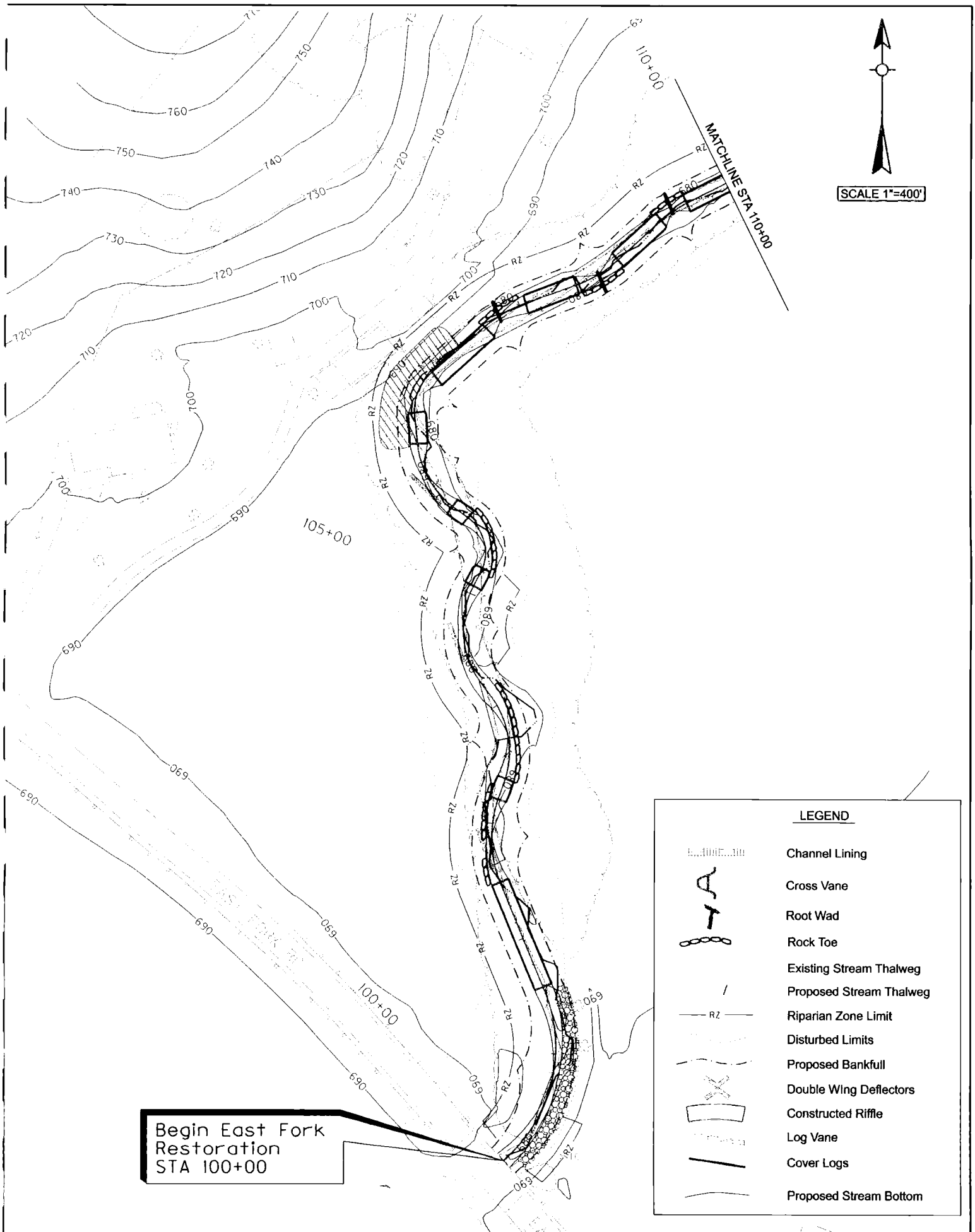
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Existing Stream

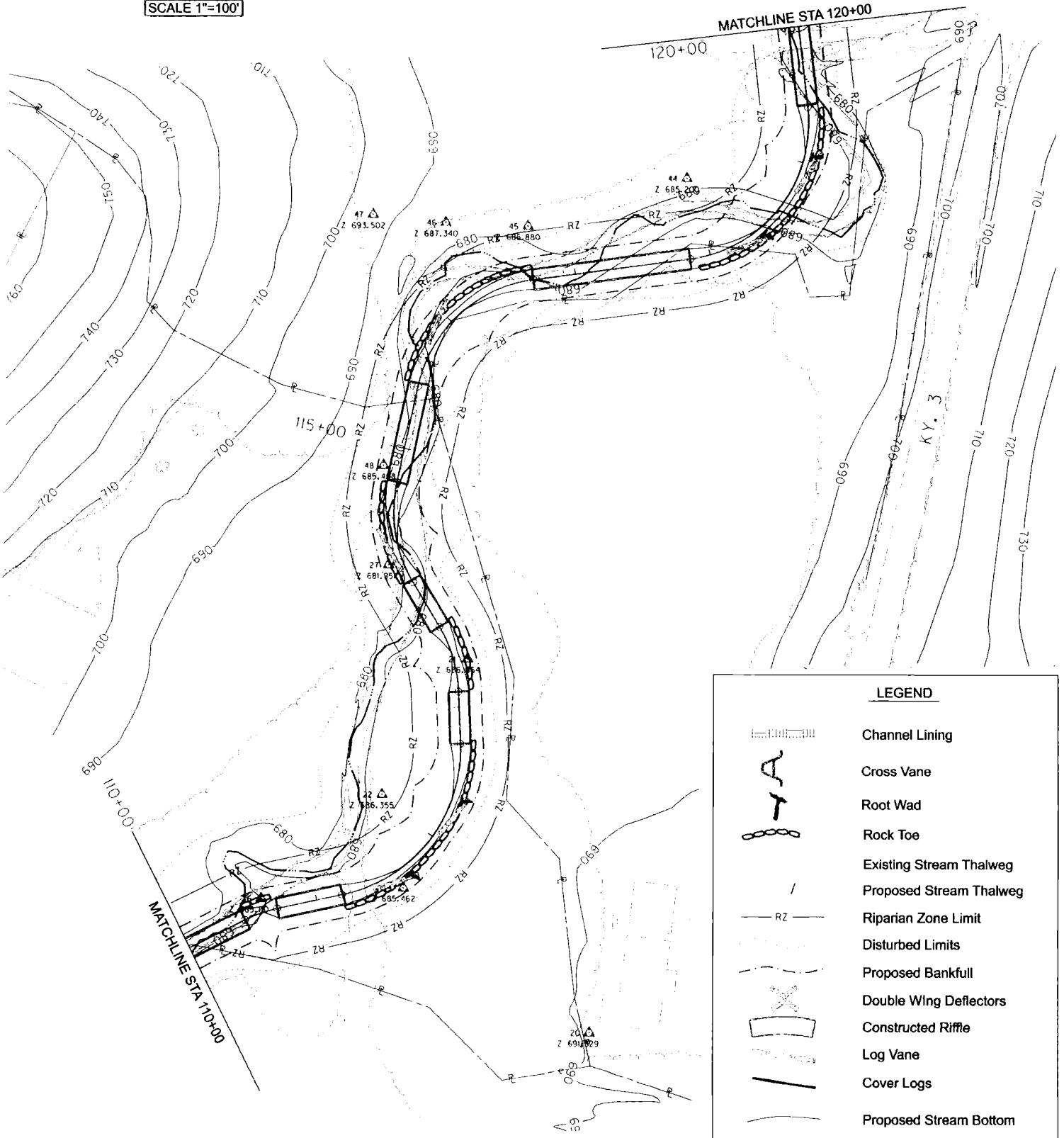


Approximate Limit of
Construction Corridor





SCALE 1"=100'



End East Fork
Restoration
STA 129+13

SCALE 1"=100'

LEGEND

Channel Lining

Channel Lining

Cross Vane

Cross Vane

Root Wad

Root Wad

Rock Toe

Rock Toe

Existing Stream Thalweg

Existing Stream Thalweg

Proposed Stream Thalweg

Proposed Stream Thalweg

Riparian Zone Limit

Riparian Zone Limit

Disturbed Limits

Disturbed Limits

Proposed Bankfull

Proposed Bankfull

Double Wing Deflectors

Double Wing Deflectors

Constructed Riffle

Constructed Riffle

Log Vane

Log Vane

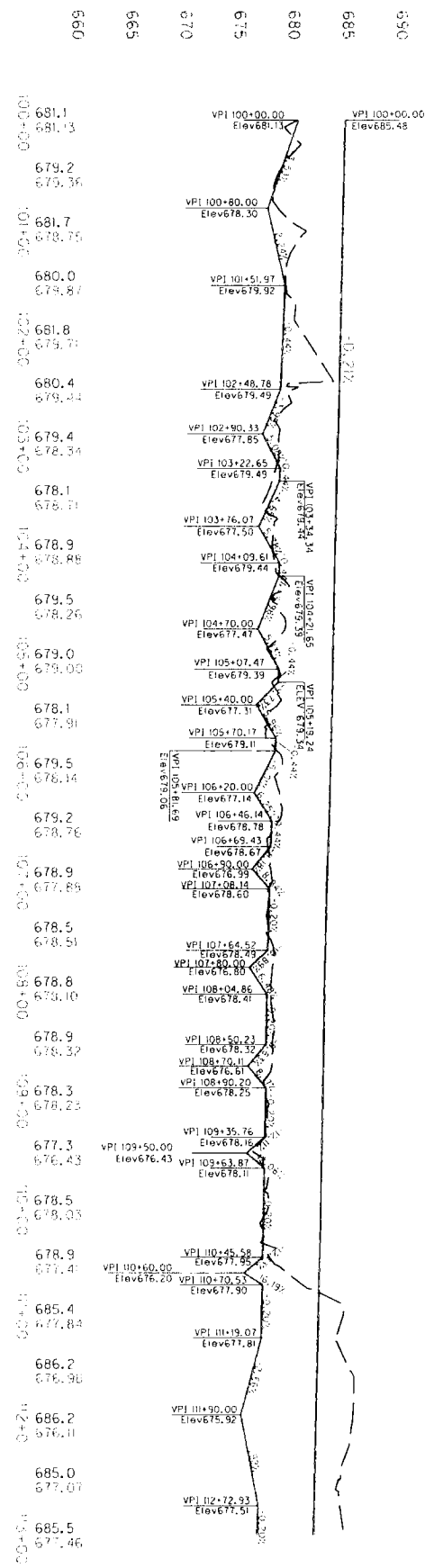
Cover Logs

Cover Logs

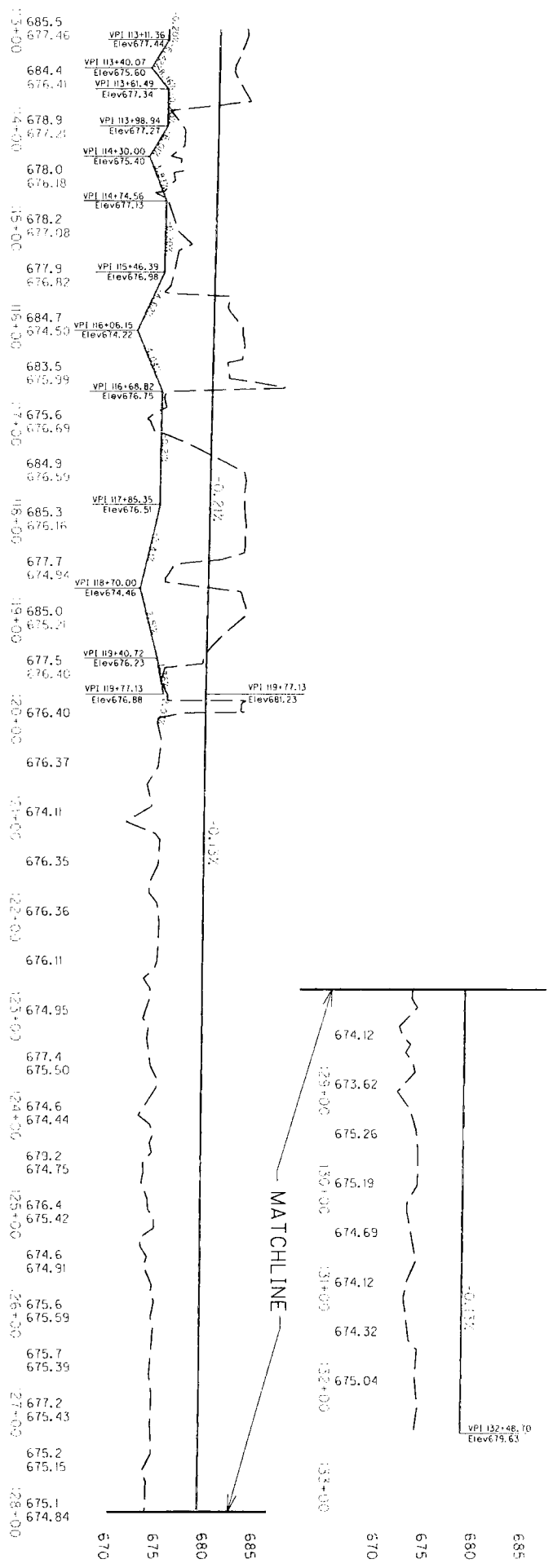
Proposed Stream Bottom

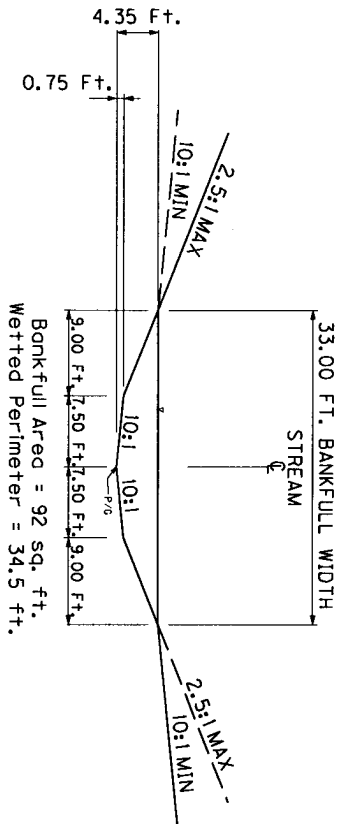
Proposed Stream Bottom

Proposed East Fork Little Sandy #4 Profile Sta 100+00 to 113+00

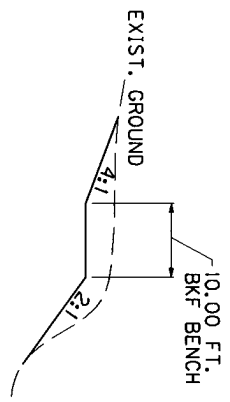


Proposed East Fork Little Sandy #4 Profile Sta 113+00 to 133+00

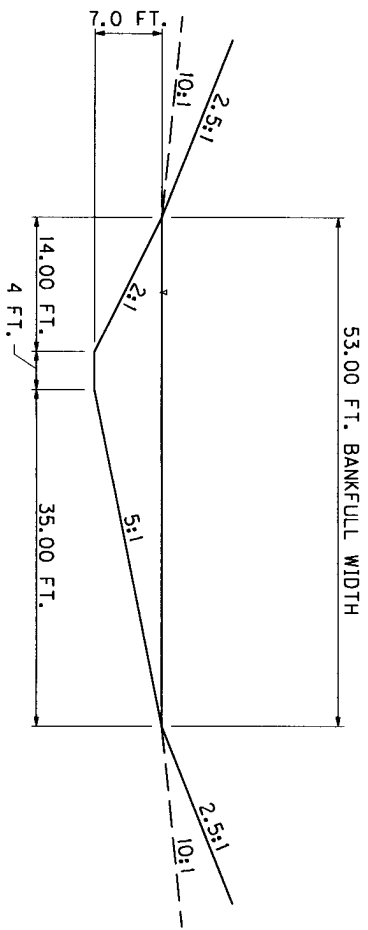




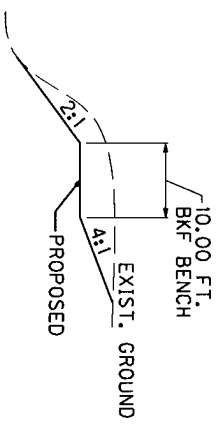
TYPICAL RIFFLE CROSS SECTION
STA 100+00 TO 119+77



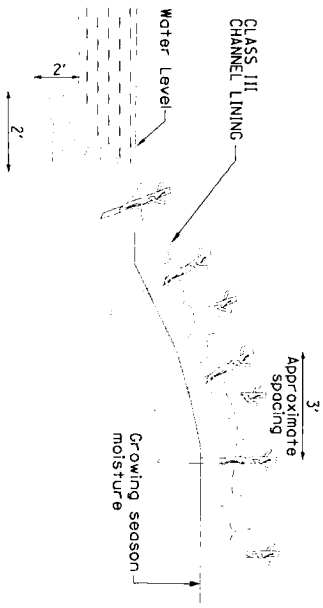
TYPICAL CROSS SECTION
STA 119+77 TO 121+75
STA 123+75 TO 129+13



Bankfull Area = 199.5 sq. ft.
Wetted Perimeter = 55.3 ft.
TYPICAL POOL CROSS SECTION
STA 100+00 TO 119+77



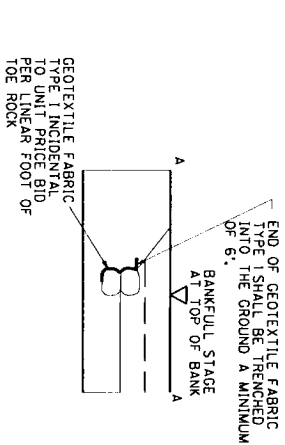
TYPICAL CROSS SECTION
STA 121+75 TO 123+75



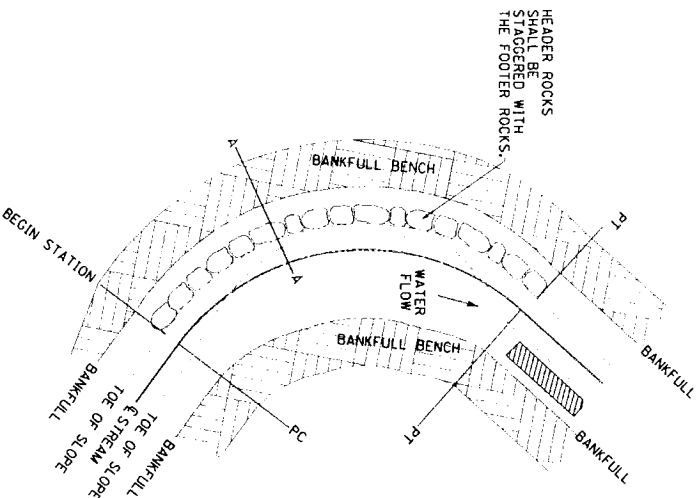
LIVE STAKE DETAIL

NOTE: Protect live stakes from damage during installation.
(a) Use pry bar to make opening in rock, OR
(b) Use tubing to provide opening.

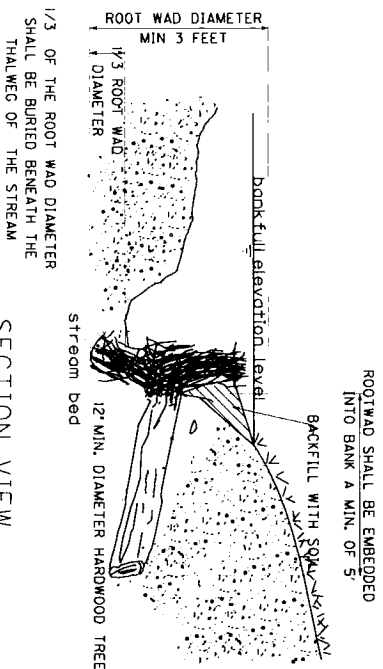
CHANNEL LINING AND JOINT PLANTING



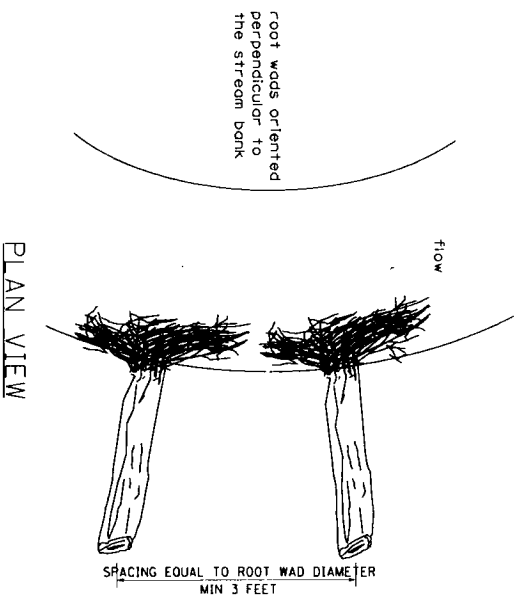
SECTION A-A CROSS SECTION



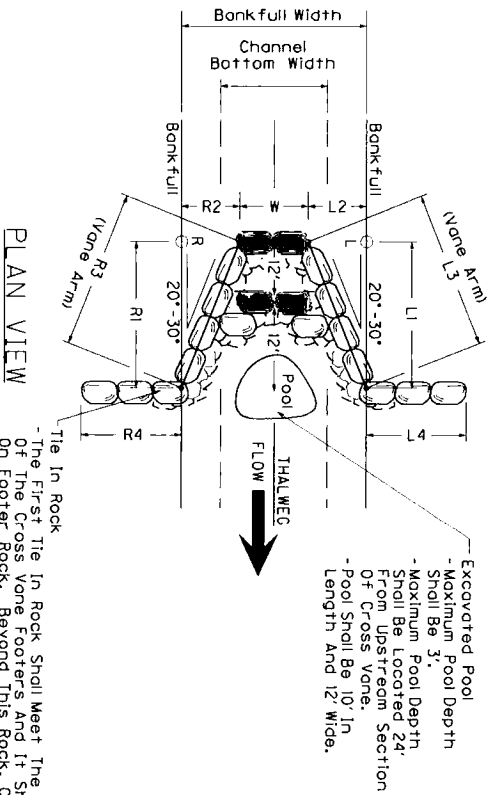
ROCK TOE DETAIL



SECTION VIEW

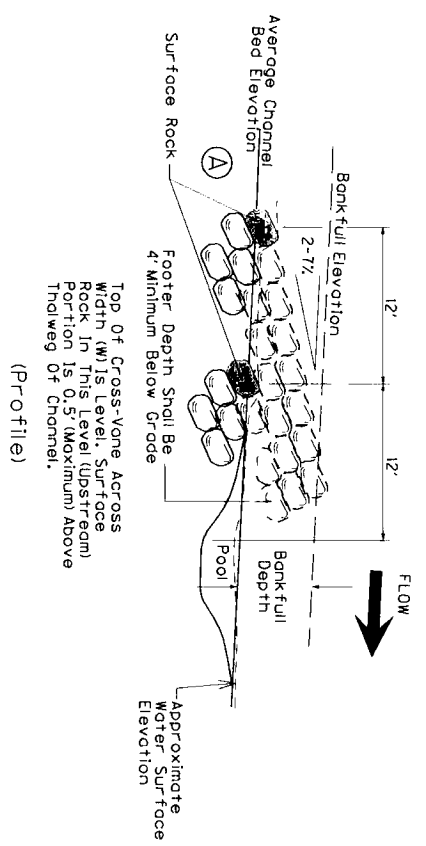


ROOT WAD DETAIL



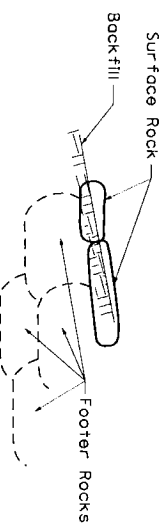
PLAN VIEW

- Tie In Rock
- The First Tie In Rock Shall Meet The Specifications Of The Cross Vane Footers And It Shall Be Placed On Footer Rock. Beyond This Rock, Class III Or Greater Sized Rock May Be Used Without Footers. This Portion Of The Tie In Shall Be 2' In Width And Depth For The Length Defined And Shall Be Buried Such That The Top Of The Rock Meets But Does Not Exceed The Proposed Ground Elevation.



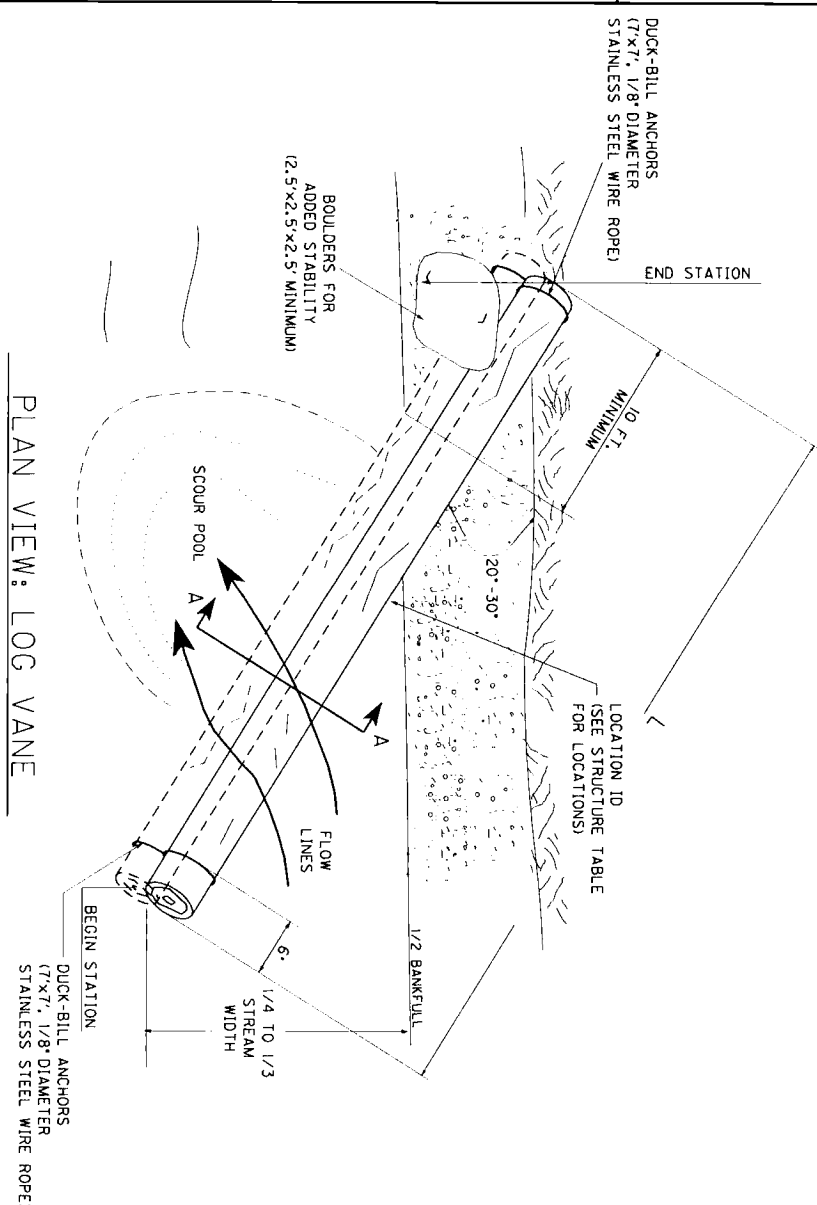
DOUBLE INVERT CROSS VANE & J-HOOK ROCKFILL

Ⓐ

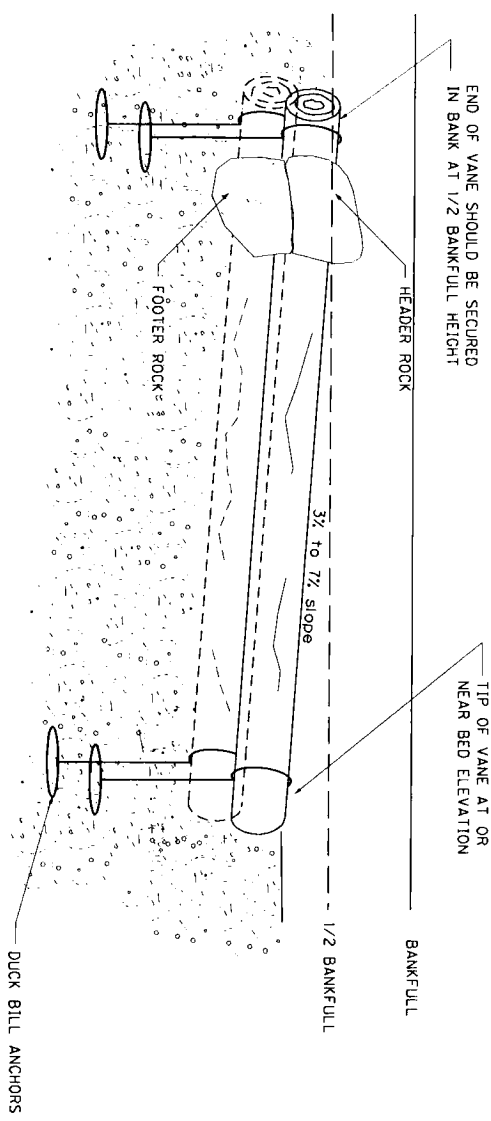
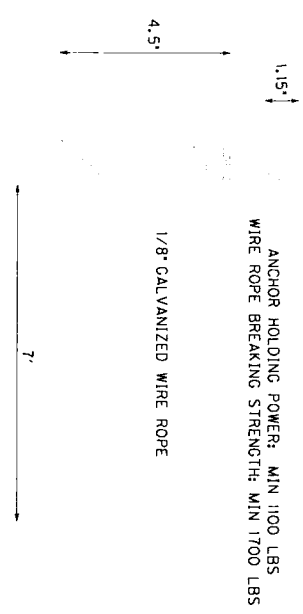


SECTION VIEW

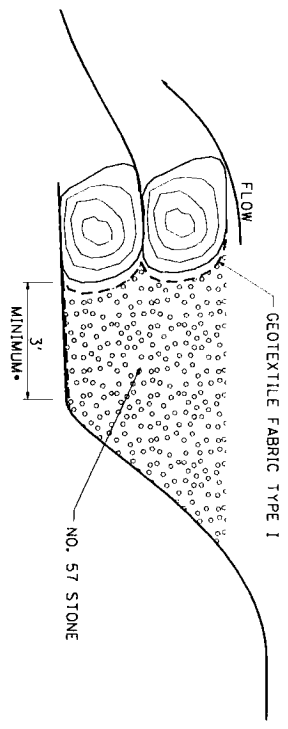
Material Excavated For Placement Of Footer Rock Shall Be Used As Backfill Upstream Of the Cross Vane. Between The Vane Arms And Bankfull, Backfill Shall Not Be Placed Upstream Of The Cross Vane In Width 'W' (See Plan View) Except To Replace The Channel Bed To Grade If Disturbed During Cross Vane Construction.



DUCKBILL ANCHOR DETAIL



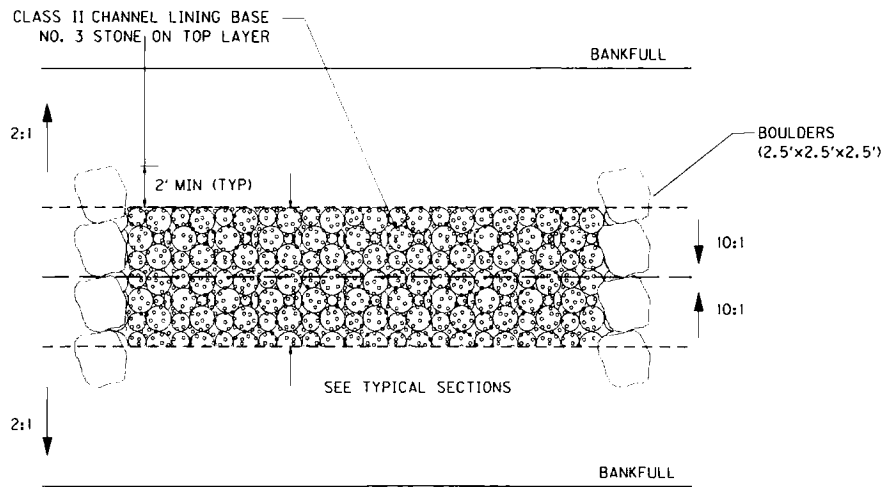
SECTION A-A



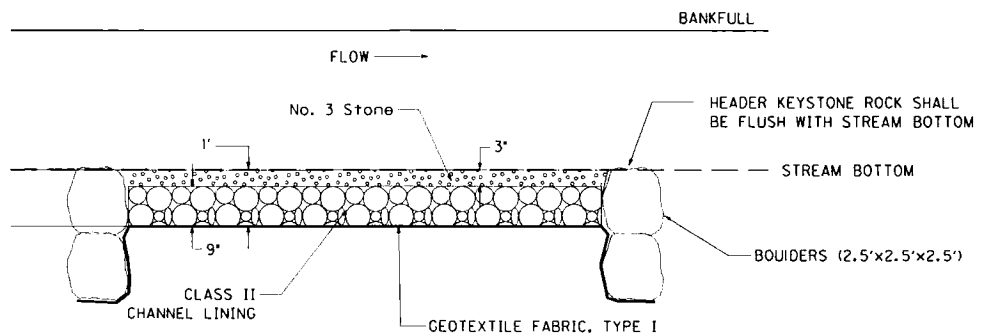
•GEOTEXTILE FABRIC SHALL EXTEND A MIN. 3' BEHIND THE FOOTER LOC.

SECTION VIEW: LOG VANE

LOG VANE



PLAN DETAIL

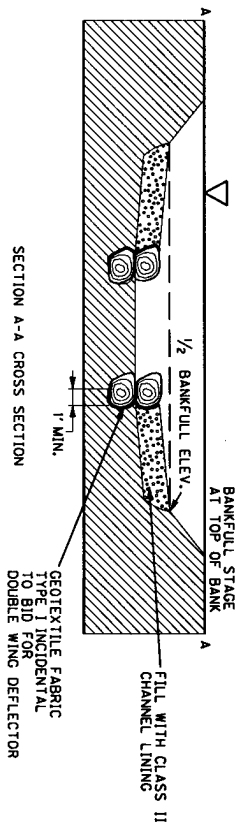
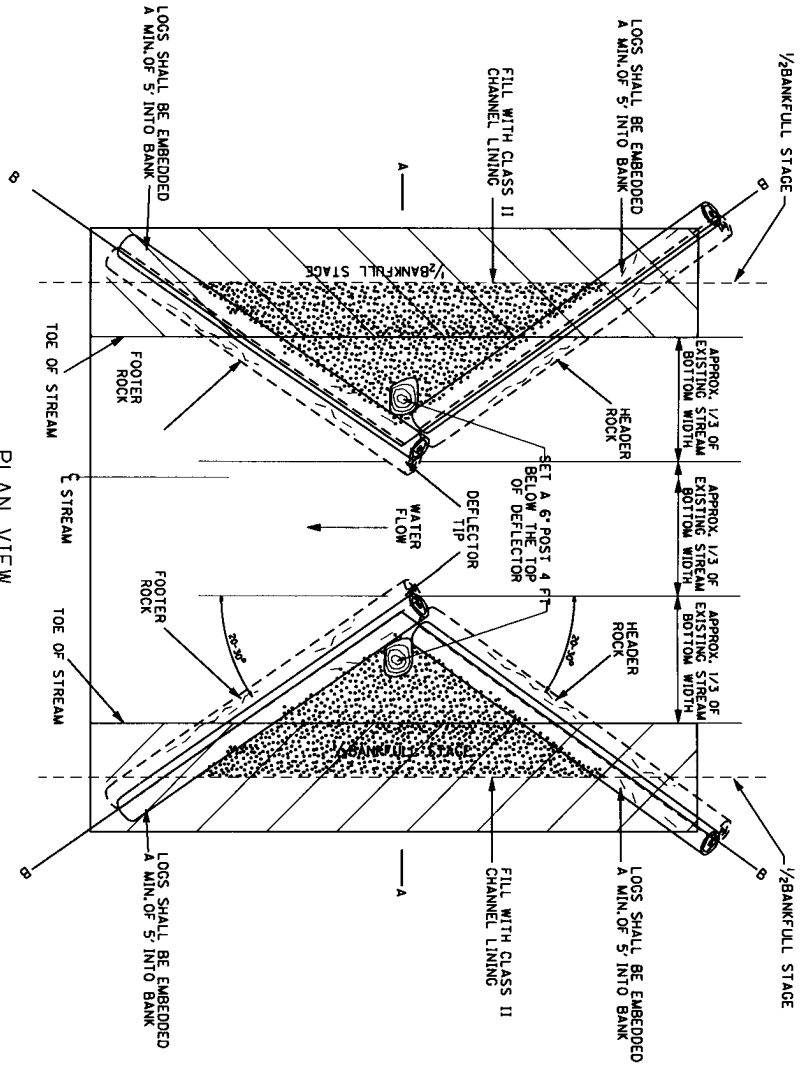


PROFILE DETAIL

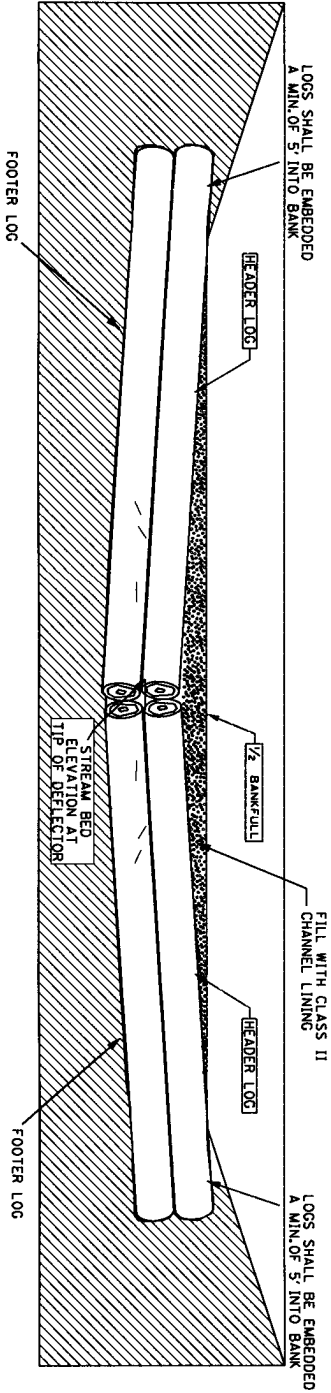
CONSTRUCTED RIFFLE

Details Not to Scale

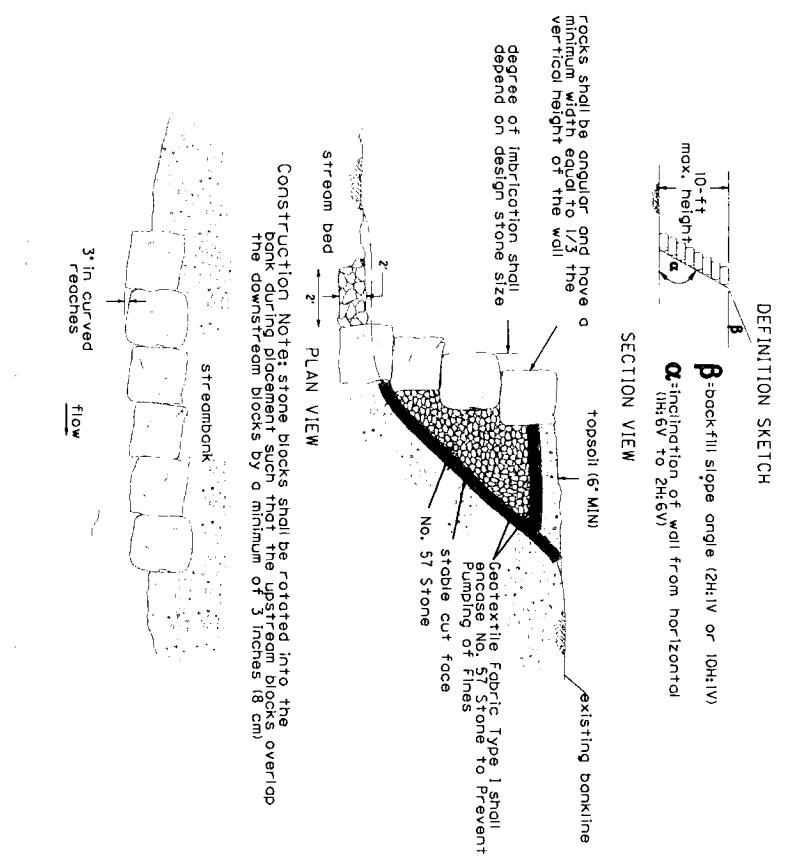
PLAN VIEW
DOUBLE WING DEFLECTOR



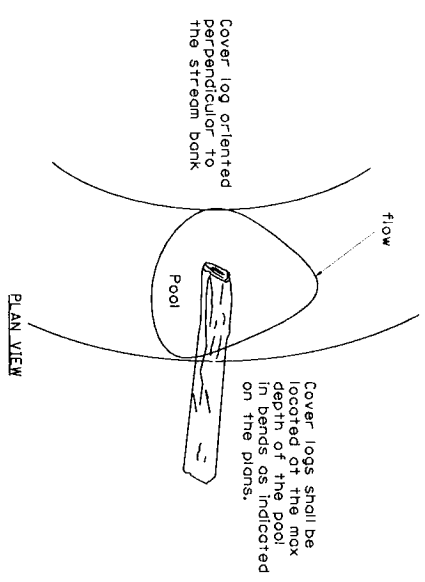
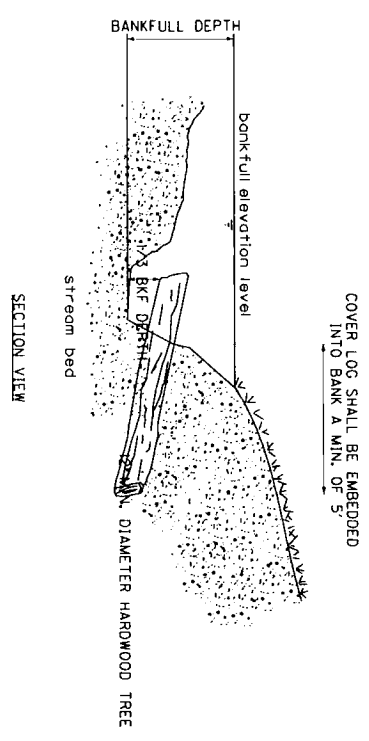
SECTION B-B
ALONG DOUBLE WING DEFLECTOR



DOUBLE WING DEFLECTOR



IMBRICATED RIP RAP



COVER LOG

TREE & SHRUB SPECIFICATIONS

- 1) ROWS OF TREES AND SHRUBS SHALL BE PLANTED IN A STAGGERED GRID PATTERN, AS SHOWN IN THE TREE AND SHRUB PLANTING PATTERN.
- 2) ALL PLANTINGS SHALL BE 3 GAL. CONTAINER GROWN.
- 3) THE PLANTING SHALL BEGIN 2 FEET FROM THE EDGE OF THE STONE PROTECTION OR BANKFULL.
- 4) PROCEDURES FOR MULCHING SHOULD BE IN ACCORDANCE WITH CURRENT EDITION OF THE KYC STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.
- 5) DURING DROUGHT CONDITIONS, PLANTINGS SHALL BE WATERED ONCE WEEKLY UNTIL ESTABLISHED OR SIGNIFICANT AMOUNT OF PRECIPITATION HAS OCCURRED. PLANTING SHALL NOT OCCUR WHEN GROUND IS FROZEN.
- 6) IF PLANTINGS ARE STORED FOR ANY REASON, CARE SHALL BE TAKEN TO ENSURE THE PLANTINGS ARE NOT DAMAGED.
- 7) TREES & SHRUBS SHALL BE PLANTED BETWEEN THE DATES OF SEPTEMBER 1 AND DECEMBER 1 OR MARCH 15 AND JUNE 15.
- 8) IF ANY OF THE TREES OR SHRUBS BECOME UNAVAILABLE, A REPLACEMENT TREE OR SHRUB SHALL BE COORDINATED WITH THE BA PERMIT.

EROSION CONTROL SPECIFICATIONS

GEOTEXTURE EROSION CONTROL FABRIC

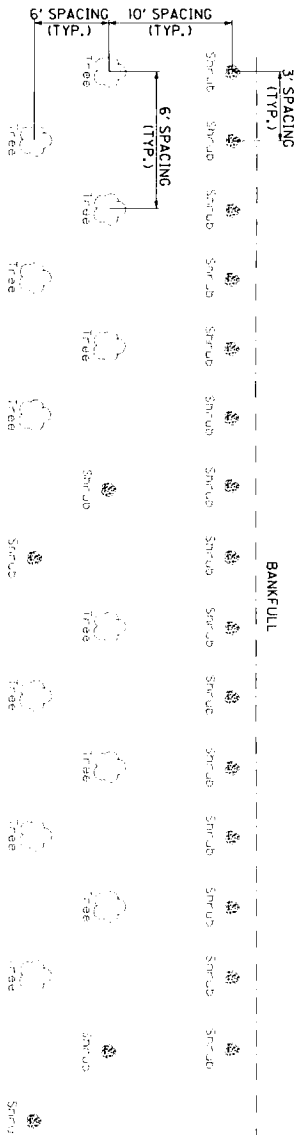
GEOTEXTURE EROSION CONTROL FABRIC SHALL BE INSTALLED BEGINNING 2 FEET FROM THE EDGE OF BANKFULL AND EXTEND TO THE TOE OF SLOPE OF THE CHANNEL. THE FABRIC SHALL BE ROLLED OUT IN THE DIRECTION OF THE ANTICIPATED RUN-OFF FLOW. THE TOP OF THE FABRIC SHALL BE BURIED IN A 6-INCH DEEP TRENCH, SECURE THE BLANKET BY WOOD STAKES AND OVERLAP AT THE SEAMS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. LAY GEOTEXTURE LOOSELY, DO NOT STRETCH. AREAS THAT DO NOT ESTABLISH VEGETATION OR BECOME UNSTABLE SHALL BE REMOVED. THE FABRIC SHALL BE MADE OF WOVEN JUTE, UNDYED AND UNBLEACHED WITH 60%-65% OPEN AREA, 1-2 YEAR DURABILITY, SHEAR STRENGTH OF A MIN. 0.45 LB / SQ. FT AND SMOLDER RESISTANT. ANTI-WASH/GEOTEXTURE OR APPROVED EQUAL SHALL BE USED FOR GEOTEXTURE EROSION CONTROL FABRIC.

RIPIARIAN ZONE SEED MIX

THE FOLLOWING NATIVE GRASSES WILL BE SOWN THROUGHOUT THE IDENTIFIED RIPIARIAN ZONE, INCLUDING THE CHANNEL BANK SLOPES NOT LINED WITH STONE. THE GRASSES WILL BE SOWN AT A RATE OF 2 LBS. PER 1000 SQ. FT.

ANNUAL RYE (<i>Lolium multiflorum</i>)	10%
PARTURIDGE PEA (<i>Chamaecrista fasciculata</i>)	15%
VIRGINIA WILDBLUE (<i>Elymus virginicus</i>)	20%
SWITCH GRASS (<i>Panicum virgatum</i>)	15%
DEERTONGUE GRASS (<i>Panicum clandestinum</i>)	15%
PURPLE TOP (<i>Tridens flavus</i>)	15%
INDIAN GRASS (<i>Sorghastrum nutans</i>)	10%

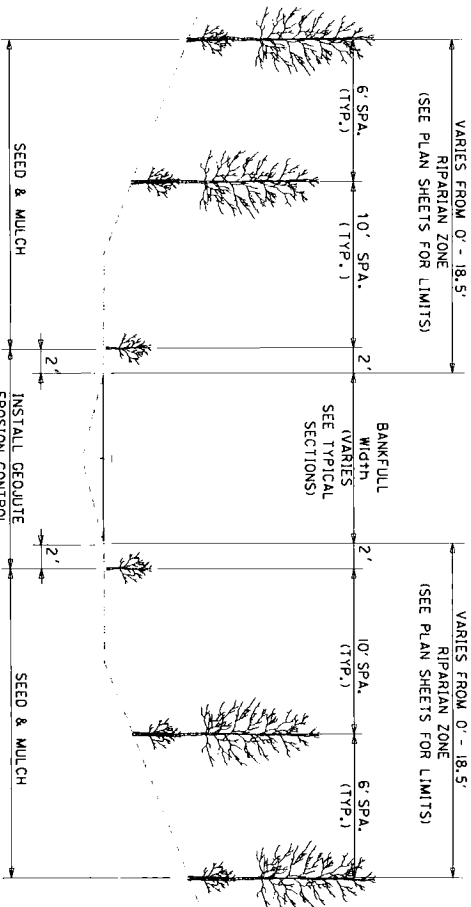
*SEED RATES ARE GIVEN AS A PERCENTAGE OF THE TOTAL MIX BY WEIGHT.
*THIS SEED MIXTURE MAY BE BROADCAST (SEE SEED PLANTING SPECIFICATIONS)



PLANTING DETAIL

- NOTE:
1) THE FIRST ROW OF PLANTINGS SHALL CONSIST OF ALTERNATING SHRUBS. PLANTINGS SHALL HAVE 3' OF SPACING.

- 2) ADDITIONAL ROWS, BEGINNING 10' OFF THE SECOND ROW, SHALL CONSIST OF ALTERNATING TREES WITH AN ALTERNATING SHRUB AFTER EVERY THIRD TREE PLANTING. SEE THE PLANTING DETAIL FOR EXAMPLE OF PLANTING SEQUENCE. EACH ROW SHALL BE STAGGERED IN RELATION TO THE ROW BEFORE IT. SPACING BETWEEN PLANTINGS SHALL BE 6'x6'.



TYPICAL RIPIARIAN ZONE CROSS SECTION
(SEE PLANTING DETAIL FOR PATTERN)

Exhibit 4 – Photographs of East Fork Little Sandy



Assessment Point No. 1 – Looking upstream



Assessment Point No. 1 – Looking downstream



Assessment Point No. 2 – Looking upstream



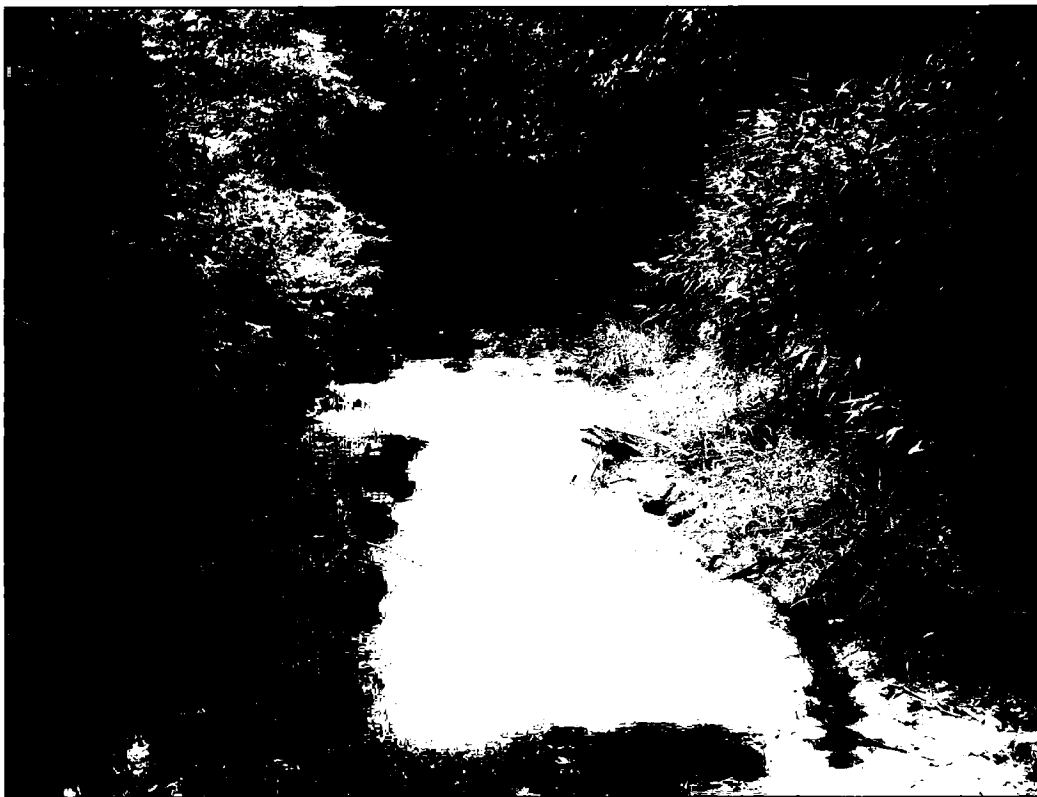
Assessment Point No. 2 – Looking downstream



Assessment Point No. 3 – Looking upstream



Assessment Point No. 3 – Looking downstream



Assessment Point No. 4 – Looking upstream



Assessment Point No. 4 – Looking downstream

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: <i>EFLS #4 Assessment 1</i>			LOCATION: <i>WP 14</i>		
STATION:	DRAINAGE AREA (AC)	<i>6400</i>	BASIN/WATERSHED <i>Little Sandy River</i>		
LAT: <i>38-13-05.2</i>	LONG: <i>82-44-07.5</i>		COUNTY; <i>Lawrence</i> USGS 7.5 TOPO; <i>Fallsburg</i>		
DATE: <i>7/02/08</i>	TIME: <i> </i>	<input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS; <i>Rob Lewis</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny <input checked="" type="checkbox"/>					
Has there been a heavy rain in the last 7 days? Air temperature <i>85</i> °F. Inches rainfall in past 24 hours <i>0</i> in <i>70</i> % Cloud Cover					
P-Chem: Temp (°F) <i>69.6</i> D.O. (mg/l) <i> </i> % Saturation <i> </i> pH(S.U.) <i> </i> Cond.µs <i>179.9</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width EOW <i>3-10</i> ft Stream Width BF <i>18-25</i> ft Range of Depth <i>0.2-2.0</i> ft Bank Full Depth <i>1.5-3.0</i> ft Est. Reach Length <i> </i> ft			LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input checked="" type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts Stream Flow; <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential Stream Type; <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep					
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <i>Sycamore</i> <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous <i>Walnut</i> Number of Strata <i>3</i> <i>Willow</i> <i>Box Elder</i>		Canopy Cover; <input type="checkbox"/> Fully Exposed (0-25%) <input checked="" type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)		Channel Alterations; Dredging <input checked="" type="checkbox"/> Channelization (<input type="checkbox"/> Full <input checked="" type="checkbox"/> Partial)	
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle <i>10</i> %	Run; <i> </i> %	Pool <i>90</i> %	
Silt/Clay (<0.06 mm)				<i>20</i>	
Sand (0.06-2 mm)		<i>30</i>		<i>60</i>	
Gravel (2-64 mm)		<i>70</i>		<i>20</i>	
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
Habitat	Condition Category				
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

105

NOTES/COMMENTS; Deeply incised, with areas of vertical active erosion. Large sand bars present.

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: <i>EFLS #4 Assessment 2</i>			LOCATION: <i>WP 15</i>		
STATION:		DRAINAGE AREA (AC)	BASIN/WATERSHED <i>Little Sandy River</i>		
LAT: <i>38-13-10.7</i>		LONG: <i>82-44-03.8</i>	COUNTY; <i>Lawrence</i> USGS 7.5 TOPO; <i>Fallsburg</i>		
DATE: <i>7/02/08</i>		TIME: <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS; <i>Rob Lewis</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain Air temperature <i>85</i> °F. Inches rainfall in past 24 hours <i>0</i> in <input type="checkbox"/> Intermittent showers <i>70</i> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny					
P-Chem: Temp (°F) <i>69.6</i> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. µs <i>176.8</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width EOW <i>3-6</i> ft Stream Width BF <i>18-25</i> ft Range of Depth <i>0.1-1.5</i> ft Bank Full Depth <i>2.0-3.5</i> ft Est. Reach Length _____ ft			LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep <input type="checkbox"/> Other <input type="checkbox"/> Culverts					
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <i>Box Elder</i> <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous <i>Elm</i> Number of Strata <i>3</i> <i>Black willow</i>		Canopy Cover; <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)		Channel Alterations; Dredging <input type="checkbox"/> Channelization (<input type="checkbox"/> Full <input type="checkbox"/> Partial)	
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.		Riffle <i>10</i> %	Run; _____ %	Pool <i>90</i> %	
Silt/Clay (<0.06 mm)		<i>10</i>		<i>20</i>	
Sand (0.06-2 mm)		<i>40</i>		<i>70</i>	
Gravel (2-64 mm)		<i>50</i>		<i>10</i>	
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
Habitat		Condition Category			
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

103

NOTES/COMMENTS; Clay present in banks. A lot of trash in stream, and powerlines overhead.

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: <i>EFLS #4 Assessment 3</i>			LOCATION: <i>WP 16</i>		
STATION:	DRAINAGE AREA (AC)	<i>6400</i>	BASIN/WATERSHED <i>Little Sandy River</i>		
LAT: <i>38-13-15</i>		LONG: <i>82-44-00.3</i>	COUNTY; <i>Lawrence</i> USGS 7.5 TOPO; <i>Fallsburg</i>		
DATE: <i>7/02/08</i>		TIME: <i>;</i> <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS; <i>Rob Lewis</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Steady rain <input type="checkbox"/> Air temperature <i>85</i> °F. Inches rainfall in past 24 hours <i>0</i> in <input type="checkbox"/> Intermittent showers <i>70</i> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny					
P-Chem: Temp (°F) <i>67.1</i> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. µs <i>178.5</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width EOW <i>10-12</i> ft Stream Width BF <i>20-30</i> ft Range of Depth <i>0.2-3.0</i> ft Bank Full Depth <i>2.0-4.0</i> ft Est. Reach Length _____ ft			LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input type="checkbox"/> Culverts			Stream Flow; <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep		
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata <i>3</i>			Dom. Tree/Shrub Taxa <i>Sycamore Sumac</i> <i>Box Elder Rose</i> <i>Elm</i> <i>Willow</i>		
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.			Riffle <i>2</i> % Run; _____ % Pool <i>98</i> %		
Silt/Clay (<0.06 mm)			<i>20</i>		
Sand (0.06-2 mm)			<i>70</i>		
Gravel (2-64 mm)			<i>30</i>		
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
Habitat		Condition Category			
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend: bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

92

NOTES/COMMENTS; Debris jams, and a lot of sediment bars. Fish noted.

Appendix 1

High Gradient Stream Data Sheet

STREAM NAME: <i>EFLS #4 Assessment 4</i>			LOCATION: <i>WP 17</i>		
STATION:		DRAINAGE AREA (AC)	BASIN/WATERSHED <i>Little Sandy River</i>		
LAT: <i>38-13-20.3</i>		LONG: <i>82-43-59.8</i>	COUNTY; <i>Lawrence</i> USGS 7.5 TOPO; <i>Fallsburg</i>		
DATE: <i>7/02/08</i>		TIME: <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS; <i>Rob Lewis</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now Past 24 hours Has there been a heavy rain in the last 7 days? <input type="checkbox"/> <input type="checkbox"/> Heavy rain <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <input type="checkbox"/> Steady rain Air temperature <i>85</i> °F. Inches rainfall in past 24 hours <i>0</i> in <input type="checkbox"/> <input type="checkbox"/> Intermittent showers <i>70</i> % Cloud Cover <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Clear/sunny					
P-Chem: Temp (°F) <i>68.2</i> D.O. (mg/l) % Saturation pH(S.U.) Cond.µs <i>252</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width EOW <i>3-10</i> ft Stream Width BF <i>18-25</i> ft Range of Depth <i>0.1-2.0</i> ft Bank Full Depth <i>2.0-4.0</i> ft Est. Reach Length _____ ft			LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers		
Hydraulic Structures: Stream Flow; Stream Type; <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep <input type="checkbox"/> Other <input type="checkbox"/> Culverts					
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata <i>3</i>		Dom. Tree/Shrub Taxa <i>Walnut</i> <i>Ash</i> <i>Box Elder</i> <i>Sumac</i> <i>Hickory</i> <i>Rose</i> <i>Willow</i>		Canopy Cover; <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input checked="" type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations; Dredging <input checked="" type="checkbox"/> Channelization (<input type="checkbox"/> Full <input checked="" type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C. Riffle <i>10</i> % Run; _____ % Pool <i>90</i> %					
Silt/Clay (<0.06 mm)					
Sand (0.06-2 mm)		<i>30</i>		<i>90</i>	
Gravel (2-64 mm)		<i>70</i>		<i>10</i>	
Cobble (64-256 mm)					
Boulders (>256 mm)					
Bedrock					
Habitat		Condition Category			
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

93

NOTES/COMMENTS; A lot of bank failure. Straightened for agriculture.

Appendix 2

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:

Kentucky Department of Fish & Wildlife Resources, Attn: Benjy Kinman,
1 Sportsman's Lane, Frankfort, KY 40601

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: Kentucky County/parish/borough: Lawrence City: Louisa (nearest)

Center coordinates of site (lat/long in degree decimal format):

Lat. 38.2206°N, Long. 82.7338°W.

Universal Transverse Mercator: 4231715N 348225E

Name of nearest waterbody: East Fork Little Sandy

Identify (estimate) amount of waters in the review area:

Non-wetland waters: 3159 linear feet: 22 (ave.) width (ft) and/or 1.60 acres.

Cowardin Class: N/A

Stream Flow: Perennial

Wetlands: N/A acres.

Cowardin Class:

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal: N/A

Non-Tidal: N/A

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s): 07/02/08

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this

preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "may be" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for preliminary JD (check all that apply

- checked items should be included in case file and, where checked and requested, appropriately reference sources below):

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:

- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
- ☐ Office concurs with data sheets/delineation report.
- ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps:
- ☐ Corps navigable waters' study:
- ☐ U.S. Geological Survey Hydrologic Atlas:
- ☐ USGS NHD data.
- ☒ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24000, Fallsburg, KY Quad.
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Lawrence and Martin Counties, KY; issued 2005.
- ☒ National wetlands inventory map(s). Cite name: Fallsburg, KY NWI.
- ☐ State/Local wetland inventory map(s):
- ☒ FEMA/FIRM maps: Lawrence Co. FIRM, dated 6/18/90.
- ☐ 100-year Floodplain Elevation is: _____ (National Geodetic Vertical Datum of 1929)
- ☒ Photographs: ☒ Aerial (Name & Date): _____
- or ☒ Other (Name & Date): Photos taken during assessments.
- ☐ Previous determination(s). File no. and date of response letter: _____
- ☐ Other information (please specify): _____

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Signature and date of
Regulatory Project Manager
(REQUIRED)

Signature and date of
person requesting preliminary JD
(REQUIRED, unless obtaining
the signature is impracticable)

East Fork Little Sandy River

Stream name	Latitude	Longitude	Flow Regime	Estimated amount of aquatic resource in review area	Class of aquatic resource
E.F. Little Sandy	38.2206	82.7338	Perennial	3159 linear feet	non-section 10 – non-wetland

Appendix 3

Existing Sediment Data Sheets

(In the order presented)

Reference – Reach
Active Riffle
Point Bar

Project site – Reach
Active Riffle
Point Bar

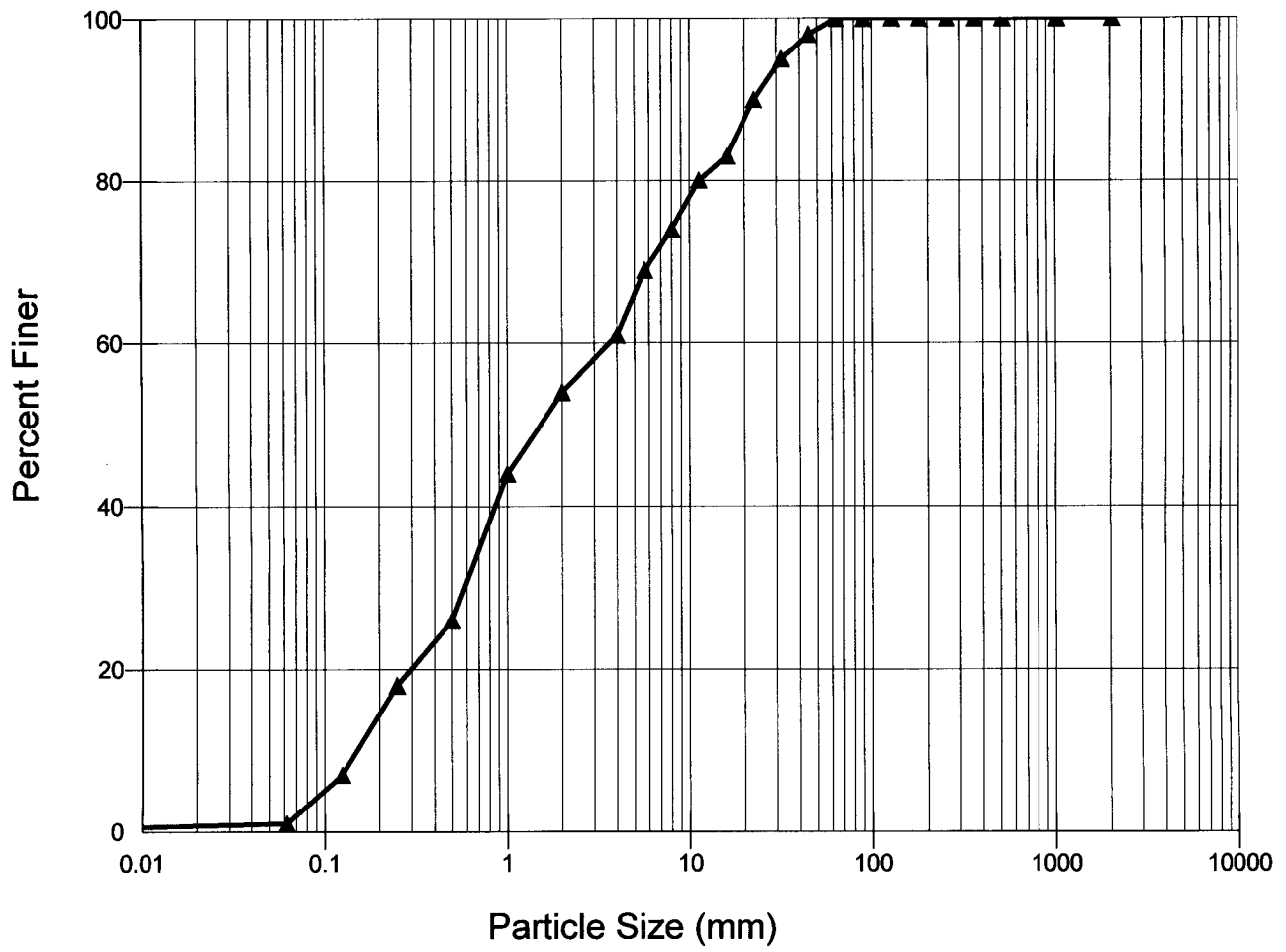
RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Reference
 Sample Name: Reach
 Survey Date: 07/03/2008

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	1.00	1.00
0.062 - 0.125	6	6.00	7.00
0.125 - 0.25	11	11.00	18.00
0.25 - 0.50	8	8.00	26.00
0.50 - 1.0	18	18.00	44.00
1.0 - 2.0	10	10.00	54.00
2.0 - 4.0	7	7.00	61.00
4.0 - 5.7	8	8.00	69.00
5.7 - 8.0	5	5.00	74.00
8.0 - 11.3	6	6.00	80.00
11.3 - 16.0	3	3.00	83.00
16.0 - 22.6	7	7.00	90.00
22.6 - 32.0	5	5.00	95.00
32 - 45	3	3.00	98.00
45 - 64	2	2.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.23		
D35 (mm)	0.75		
D50 (mm)	1.6		
D84 (mm)	16.94		
D95 (mm)	32		
D100 (mm)	64		
Silt/Clay (%)	1		
Sand (%)	53		
Gravel (%)	46		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 100.

Reach



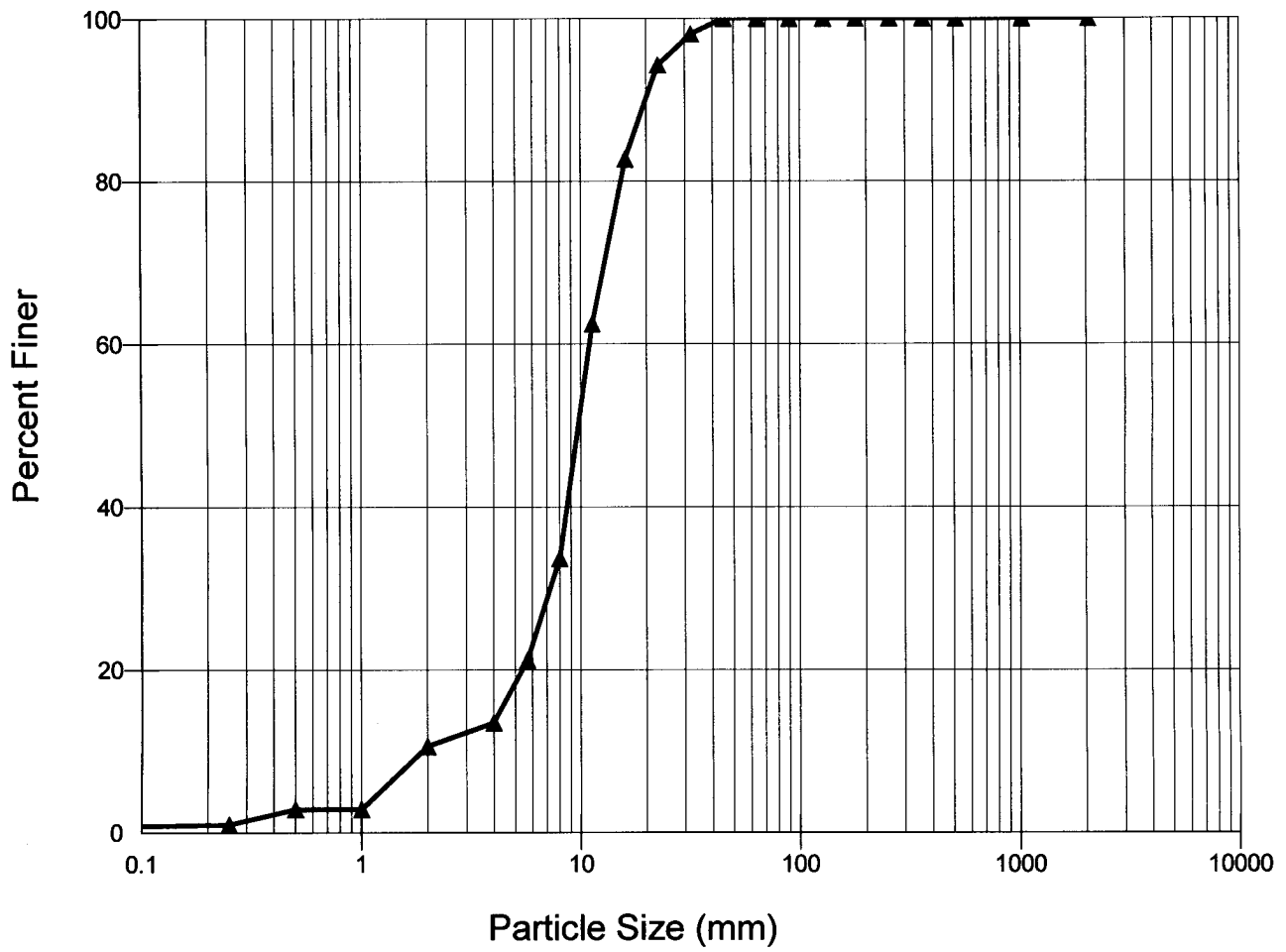
RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Reference
 Sample Name: Active_Riffle
 Survey Date: 07/03/2008

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	0	0.00	0.00
0.062 - 0.125	0	0.00	0.00
0.125 - 0.25	1	0.96	0.96
0.25 - 0.50	2	1.92	2.88
0.50 - 1.0	0	0.00	2.88
1.0 - 2.0	8	7.69	10.58
2.0 - 4.0	3	2.88	13.46
4.0 - 5.7	8	7.69	21.15
5.7 - 8.0	13	12.50	33.65
8.0 - 11.3	30	28.85	62.50
11.3 - 16.0	21	20.19	82.69
16.0 - 22.6	12	11.54	94.23
22.6 - 32.0	4	3.85	98.08
32 - 45	2	1.92	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	4.56		
D35 (mm)	8.15		
D50 (mm)	9.87		
D84 (mm)	16.75		
D95 (mm)	24.48		
D100 (mm)	45		
Silt/Clay (%)	0		
Sand (%)	10.58		
Gravel (%)	89.42		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 104.

Active Riffle



RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Reference
 Sample Name: Bar_1
 Survey Date: 07/03/2008

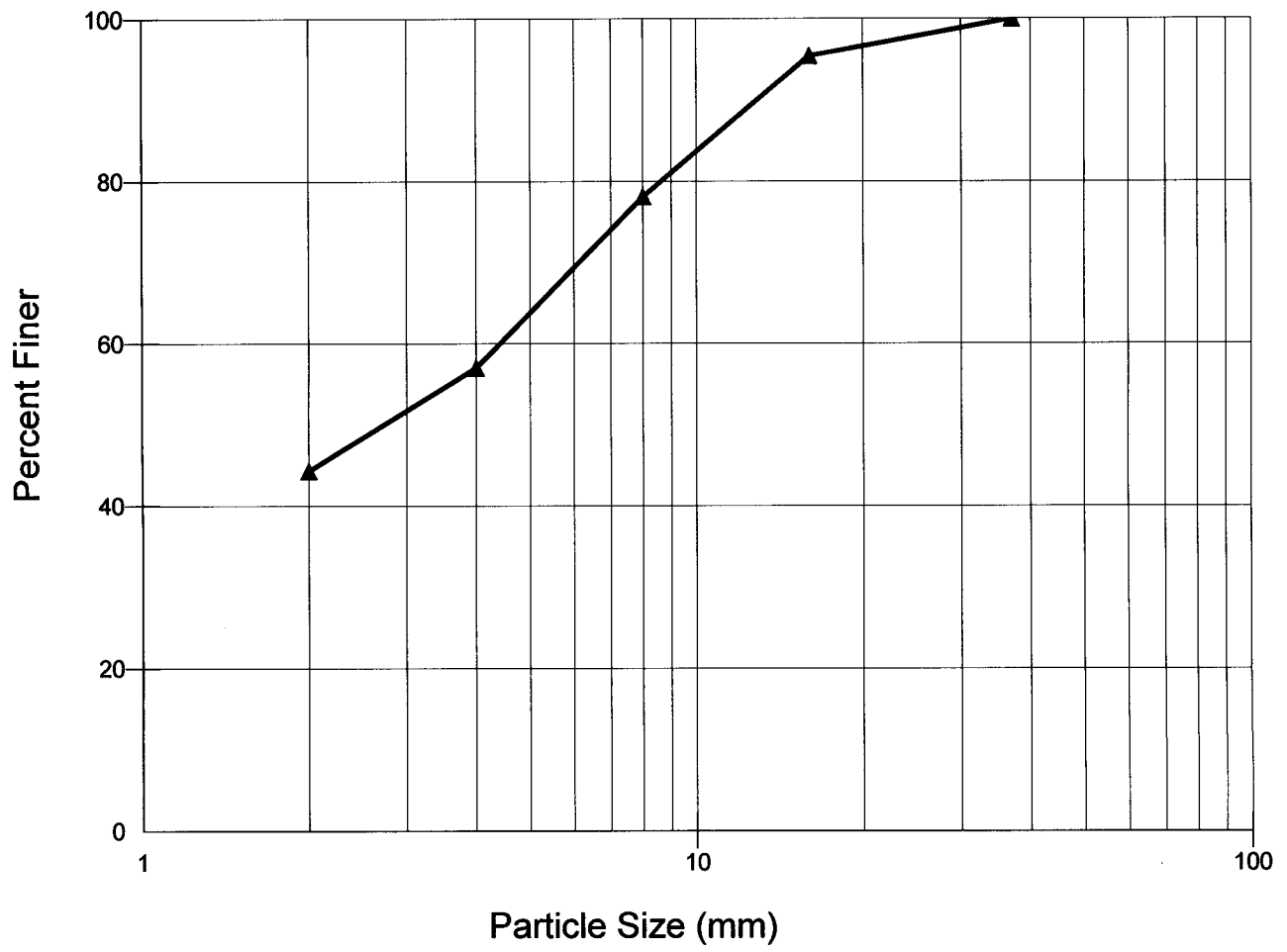
SIEVE (mm)	NET WT
16	345
8	1510
4	1830
2	1105
PAN	3850
D16 (mm)	0
D35 (mm)	0
D50 (mm)	2.9
D84 (mm)	10.73
D95 (mm)	15.79
D100 (mm)	37
Silt/Clay (%)	0
Sand (%)	44.3
Gravel (%)	55.7
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total weight = 8690.0000.

Largest Surface Particles:

	Size(mm)	weight
Particle 1:	37	35
Particle 2:	25	15

Bar 1



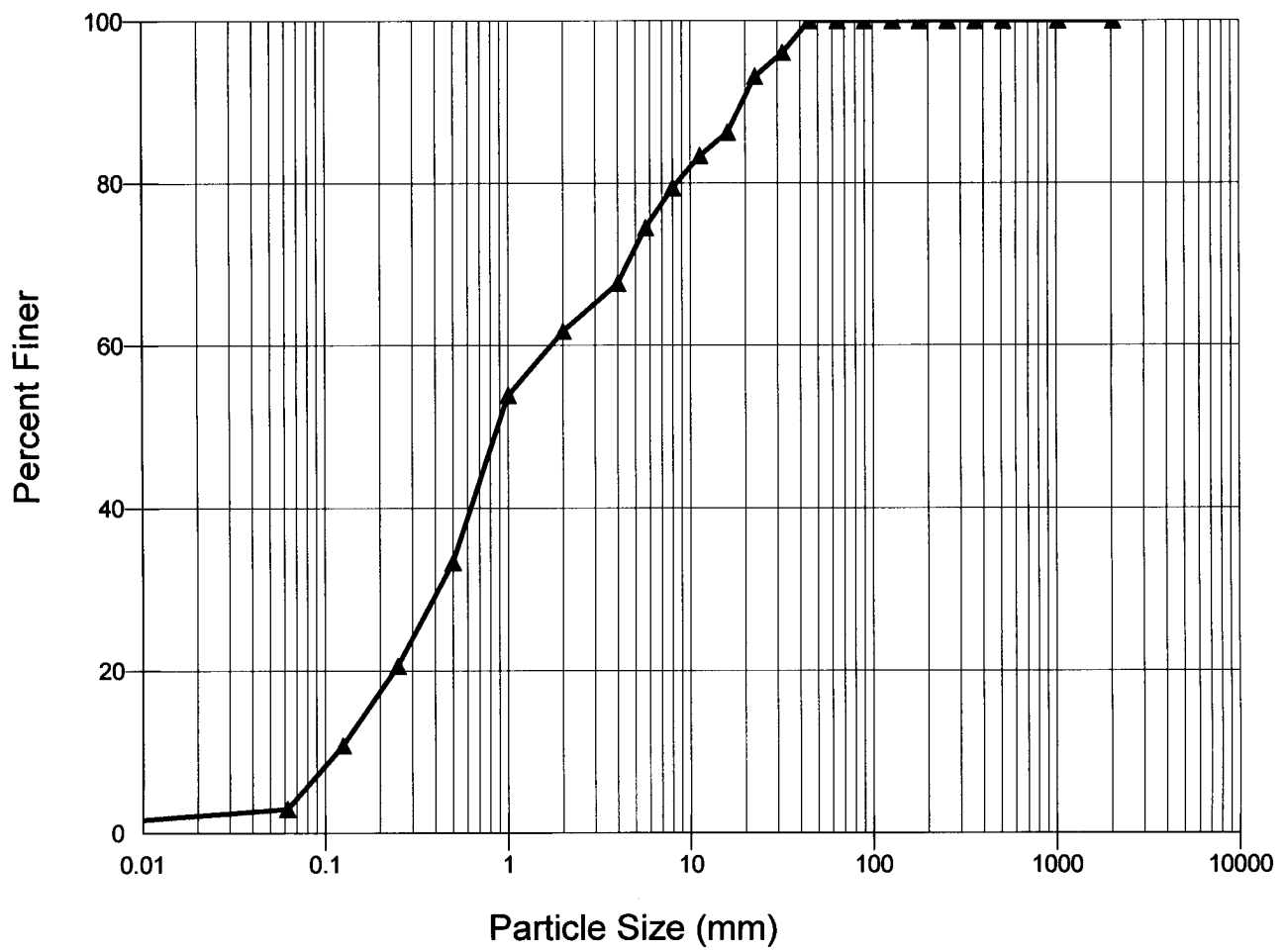
RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Impaired
 Sample Name: Reach
 Survey Date: 07/03/2008

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	3	2.94	2.94
0.062 - 0.125	8	7.84	10.78
0.125 - 0.25	10	9.80	20.59
0.25 - 0.50	13	12.75	33.33
0.50 - 1.0	21	20.59	53.92
1.0 - 2.0	8	7.84	61.76
2.0 - 4.0	6	5.88	67.65
4.0 - 5.7	7	6.86	74.51
5.7 - 8.0	5	4.90	79.41
8.0 - 11.3	4	3.92	83.33
11.3 - 16.0	3	2.94	86.27
16.0 - 22.6	7	6.86	93.14
22.6 - 32.0	3	2.94	96.08
32 - 45	4	3.92	100.00
45 - 64	0	0.00	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.19		
D35 (mm)	0.54		
D50 (mm)	0.9		
D84 (mm)	12.37		
D95 (mm)	28.55		
D100 (mm)	45		
Silt/Clay (%)	2.94		
Sand (%)	58.82		
Gravel (%)	38.24		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 102.

Reach



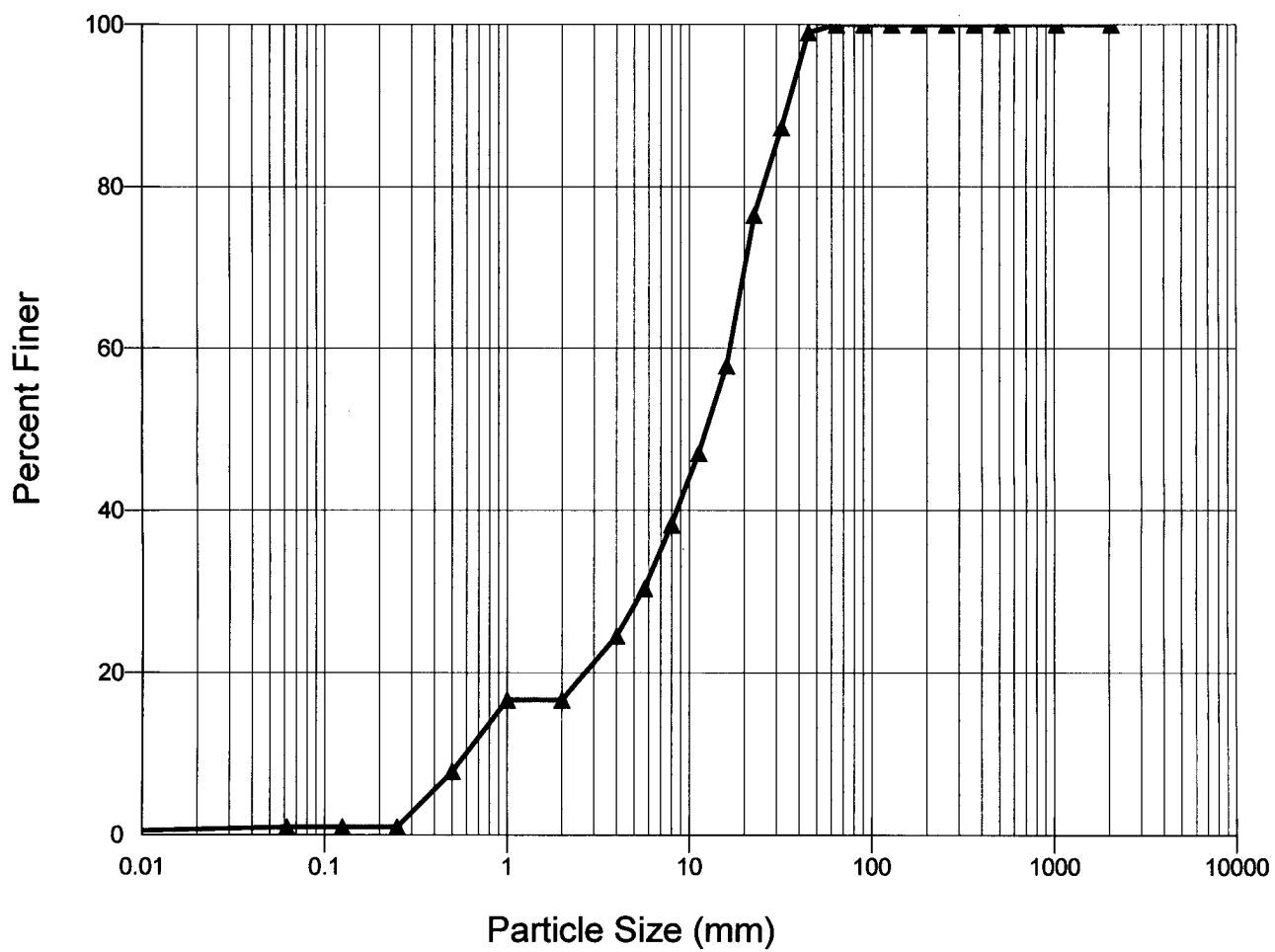
RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Impaired
 Sample Name: Active_Riffle
 Survey Date: 07/03/2008

Size (mm)	TOT #	ITEM %	CUM %
0 - 0.062	1	0.98	0.98
0.062 - 0.125	0	0.00	0.98
0.125 - 0.25	0	0.00	0.98
0.25 - 0.50	7	6.86	7.84
0.50 - 1.0	9	8.82	16.67
1.0 - 2.0	0	0.00	16.67
2.0 - 4.0	8	7.84	24.51
4.0 - 5.7	6	5.88	30.39
5.7 - 8.0	8	7.84	38.24
8.0 - 11.3	9	8.82	47.06
11.3 - 16.0	11	10.78	57.84
16.0 - 22.6	19	18.63	76.47
22.6 - 32.0	11	10.78	87.25
32 - 45	12	11.76	99.02
45 - 64	1	0.98	100.00
64 - 90	0	0.00	100.00
90 - 128	0	0.00	100.00
128 - 180	0	0.00	100.00
180 - 256	0	0.00	100.00
256 - 362	0	0.00	100.00
362 - 512	0	0.00	100.00
512 - 1024	0	0.00	100.00
1024 - 2048	0	0.00	100.00
Bedrock	0	0.00	100.00
D16 (mm)	0.96		
D35 (mm)	7.05		
D50 (mm)	12.58		
D84 (mm)	29.17		
D95 (mm)	40.56		
D100 (mm)	64		
Silt/Clay (%)	0.98		
Sand (%)	15.69		
Gravel (%)	83.33		
Cobble (%)	0		
Boulder (%)	0		
Bedrock (%)	0		

Total Particles = 102.

Active Riffle



RIVERMORPH PARTICLE SUMMARY

River Name: East Fork - Little Sandy
 Reach Name: Impaired
 Sample Name: Bar_2
 Survey Date: 07/03/2008

SIEVE (mm)	NET WT
31.5	2705
16	3610
8	2050
4	1315
2	810
PAN	5425
D16 (mm)	0
D35 (mm)	2.6
D50 (mm)	10.15
D84 (mm)	33.3
D95 (mm)	41.34
D100 (mm)	62
Silt/Clay (%)	0
Sand (%)	33.49
Gravel (%)	66.51
Cobble (%)	0
Boulder (%)	0
Bedrock (%)	0

Total weight = 16200.0000.

Largest Surface Particles:

	Size(mm)	weight
Particle 1:	45	190
Particle 2:	62	95

Bar 2



Appendix 4. Trees and shrubs to be planted.

Riparian Corridor

Trees, shrubs, and a herbaceous mix will be planted. The shrubs shall comprise the first row of non-herbaceous plantings, and also interspersed within the trees.

Trees

River Birch (*Betula nigra*)
Silver Maple (*Acer saccharinum*)
Green Ash (*Fraxinus pennsylvanica*)
Red Elm (*Ulmus rubra*)
Sycamore (*Platanus occidentalis*)
Pin Oak (*Quercus palustris*)

Shrubs

Ironwood (*Carpinus caroliniana*)
Silky Dogwood (*Cornus amomum*)
Brookside Alder (*Alnus serrulata*)

Herbaceous Mix

Annual Rye (*Lolium multiflorum*)
Partridge Pea (*Chamaecrista fasciculata*)
Virginia Wildrye (*Elymus virginicus*)
Switch Grass (*Panicum virgatum*)
Deertongue Grass (*Panicum clandestinum*)
Purple Top (*Tridens flavus*)
Indian Grass (*Sorghastrum nutans*)

Trees, shrubs and herbaceous mixes will be distributed onsite at planting and seeding rates as described in the tables that follow.

Planting requirements for Forested portion of Riparian Mitigation

	Tree's
Planting rate	630-3 gallon containers/acre
Percentage for one species at initial planting	No one species may make up more than 20% of initial planting (min 6 spp)
Monitoring Period	5 years
Percentage for one species at final count	No one species may make up more than 25% of final surviving stock
Survival Requirement	90% of initial stock**

* Length of monitoring period is conditioned on project success and Corps release.

**Volunteer species may not be counted to this requirement.

Planting requirements for Shrub component of Riparian Mitigation

	Shrubs
Planting rate	1000-3 gallon containers/acre
Percentage for one species at initial planting	No one species may make up more than 33% of initial planting (min 3 spp)
Monitoring Period	5 years
Percentage for one species at final count	No one species may make up more than 40% of final surviving stock
Survival Requirement	90% of initial stock**

Planting requirements for Herbaceous component of Riparian Mitigation

Planting Rate	Broadcast or hydro-seeding, determined by site conditions.
Species per acre	Minimum of seven species
Monitoring Period	5 years*
Ground Cover Requirement	Planted species must account for 90% ground cover at the end of monitoring
Ground Cover for individual species	No one species may comprise more than 40% of the final cover

* Length of monitoring period is conditioned on project success and Corps release.

**Volunteer species may not be counted to this requirement.

Appendix 5. Stream success criteria.

Category	Criteria	Initial Design Value	Year 1	Year 2	Year 3	Year 4	Year 5
Geomorphology	Pattern, profile, and dimension	See Proposed Values in Table 1	Values in pattern, profile, and dimension do not vary significantly (a) from design expectations and assumptions and (b) to an extent that instability and/or a change in stream type of designed reaches occurs as determined through the interim and final as-built surveys.				
	Short-term Instability	Minimal unstable areas on stream bank or within stream	Stream banks, channels, and substrate do not show any significant or unanticipated erosion or deposition problems (e.g., sloughing banks, head cuts, depositional bars) as documented through annual site inspections of all restored stream reaches and associated photographs or video.				
Habitat	EPA RBP Scores	>155	>175	>175	>185	>185	190+
Vegetation	Planted trees: <i>% survival per acre</i> <i># survival per acre</i> <i>maximum % 1 species</i> <i>minimum # species</i>	100% 630 <20% 5	>90% >570 <20% 5	>90% >570 <20% 5	>80% >500 <25% 5	>80% >500 <25% 5	>80% >500 <25% 5
	Planted shrubs: <i>% survival per acre</i> <i># survival per acre</i> <i>maximum % 1 species</i> <i>minimum # species</i>	100% 1000 <33% 2	>90% >900 <33% 2	>90% >900 <33% 2	>80% >800 <40% 2	>80% >800 <40% 2	>80% >800 <40% 2
	Non-native Trees: <i>maximum % per acre</i>	<5%	<5%	<5%	<5%	<5%	<5%
	Invasive Species <i>% survival per acre</i>	<10%	<10%	<10%	<10%	<10%	<10%
	Species List By Plot	yes	yes	yes	yes	yes	yes

Appendix 6. Estimated Ecological Lift.

Pre-project

Stream Reach	Stream Type	RBP Score	Initial Quality	Impact Length	EII	EIU
East Fork	P	79	Poor	3159	0.47	1485
Totals				3159		1485

Post-project

Stream Reach	Stream Type	RBP Score	Final Quality*	Design Length	EII	EIU
East Fork	P	191	Excellent	2913	0.92	2680
Totals				2913		2680

Ecological Lift = 2680 (EIU value derived from restored stream channel) – 1485 (EIU value of existing stream) = **1195 EIU's**